PAPER TRADE JOURNAL

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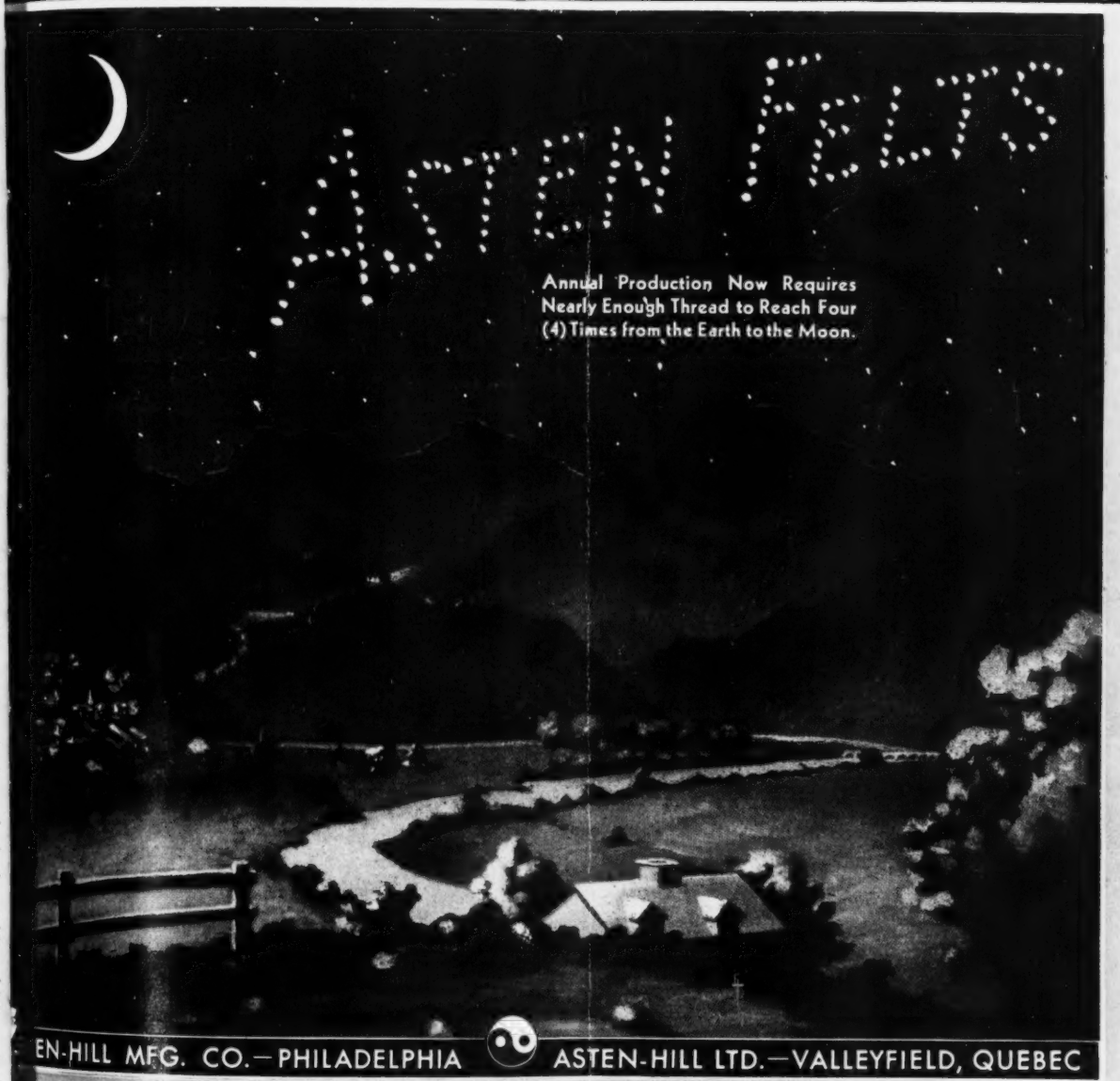
THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD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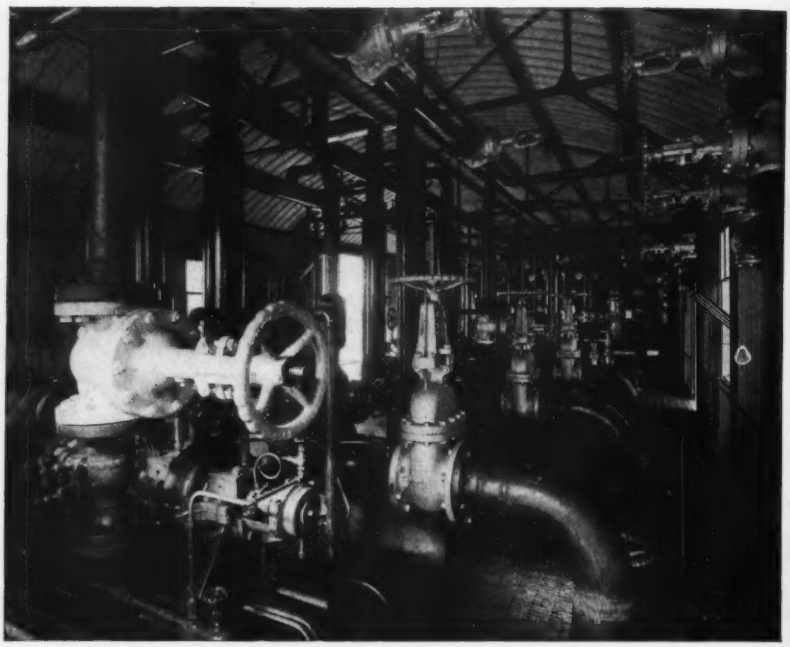

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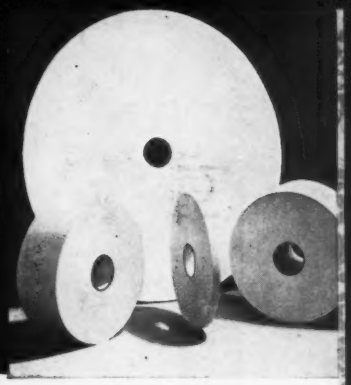

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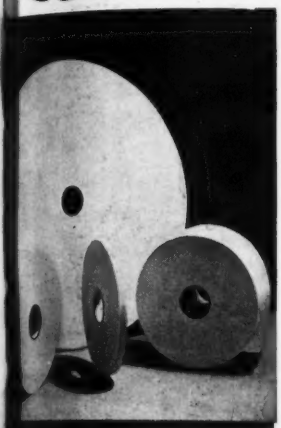

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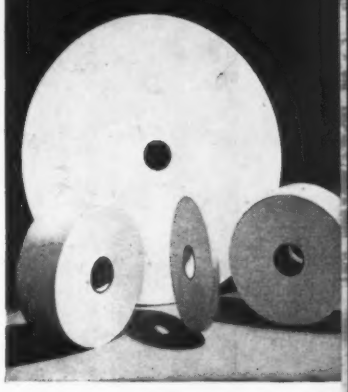

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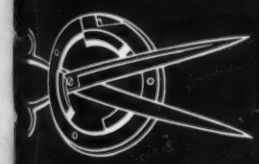

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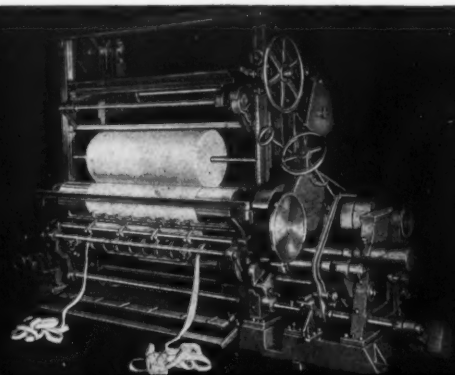

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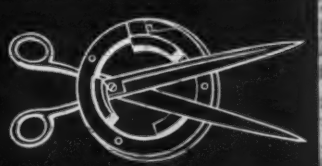

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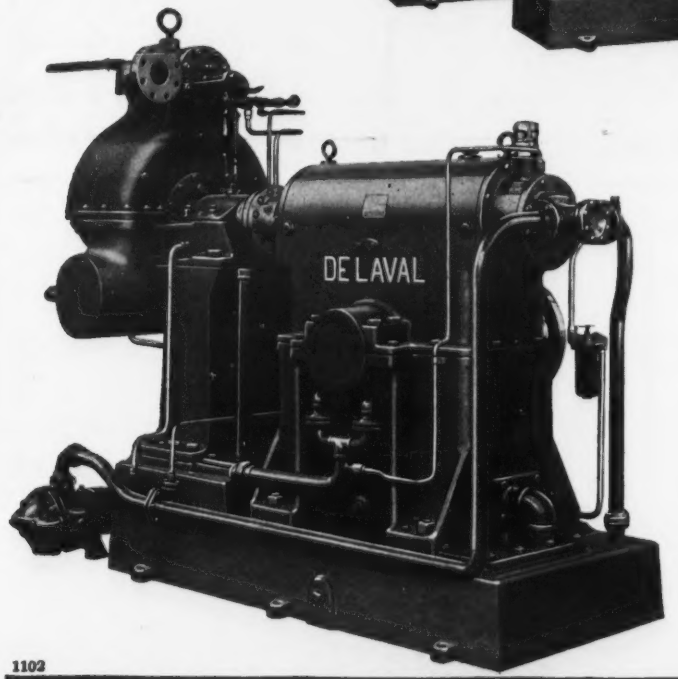

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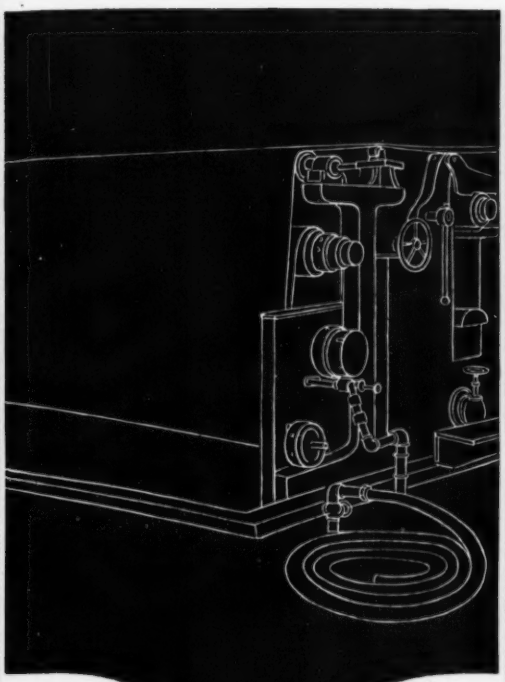

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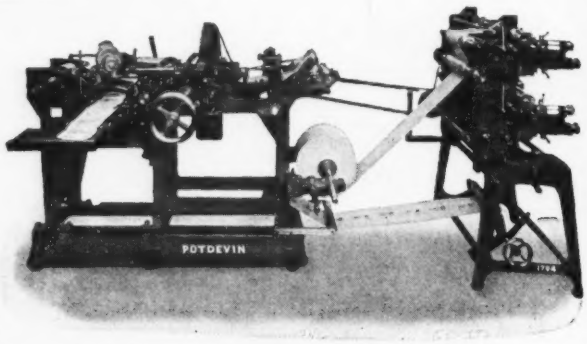

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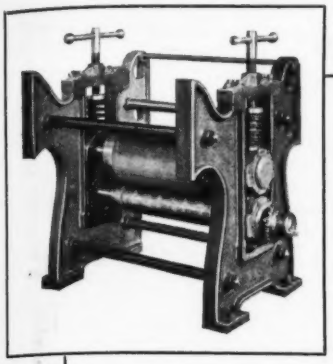

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PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

Published Every Thursday by the LOCKWOOD TRADE JOURNAL CO., Inc.

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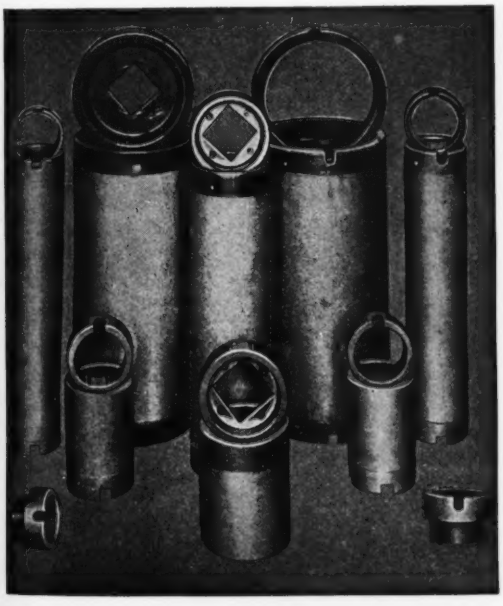

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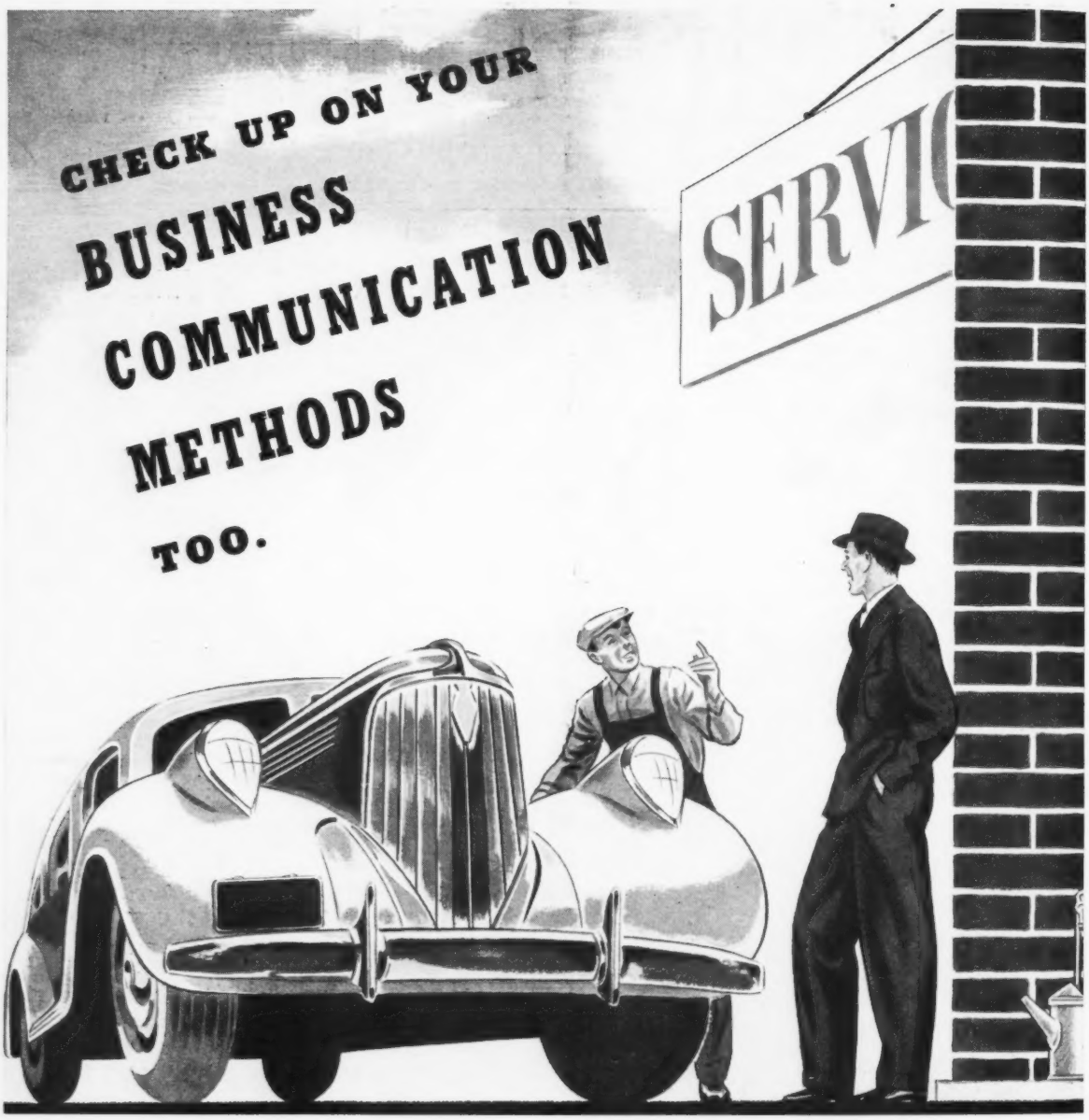

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Each company finds the joint check up valuable for a different reason. Probable benefits to your business are best revealed by telephoning your local Bell Company to send a representative.

PAPER TRADE JOURNAL

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SIXTY-SIXTH YEAR

PAPER

Established Feb. 17, 1899
Consolidated Nov. 16, 1899
with Paper Trade Journal.

Vol. CVI, No. 17 Thursday, April 28, 1938

PAPER

Established Sept. 21, 1919
Consolidated Feb. 19, 1925
with Paper Trade Journal.

Int'l Paper Co. Reports Net Of $9,220,520

Compares With $5,159,696 For Year 1936—Gross Sales Were $122,580,-688, An increase Of 9.4 Per Cent As Compared With 1936—Big Increase In Repairs Reflects Program Of Improvement now Largely Completed.

Richard J. Cullen, president of the International Paper Company, in his annual report to stockholders for the year 1937, which was made public on Thursday of this week, says in part:—

Consolidated net profit of your company and its subsidiaries for the year 1937 amounted to $9,220,520 compared with $5,159,696 for the year 1936.

Gross sales, less returns, allowances and discounts, amounted to $122,580,688, an increase of 9.4 per cent as compared with 1936. Labor and material costs increased 7.5 per cent but reductions were effected in delivery costs and in selling, general and administrative expense. The substantial increase in maintenance and repairs reflects the program of plant improvement now largely completed.

Amounts set aside during 1937 for taxes—local, state, federal and foreign—of International Paper Company and its subsidiaries totalled $5,074,570. This is equivalent to $5.28 on each outstanding share of 7 per cent preferred stock or more than double the entire dividends paid to stockholders during the year.

A dividend of $2.50 a share was paid December 10, 1937 on the company's outstanding cumulative 7 per cent preferred stock applying against accumulated dividend arrearages. In view of the uncertainties of the current business situation, the directors did not feel justified in declaring any dividends during the first quarter of 1938.

Change in Inventory Policy

Prior to 1937 the companies valued their inventories at direct cost or at market, whichever was lower. As of January 1, 1937, the companies adopted instead the policy of computing the cost of sales and the value of inventories on the basis that the latest materials purchased or finished products made are the first used or sold. This method is based on the "last in, first out" principle of inventory valuation.

This change in basis resulted in lower profits for the year 1937 and lower inventory values at December 31, 1937, than if the method previously followed had been used. In view of the fact that the inventories at the close of 1937 were priced only on the new basis, the amount by which the profits for the year 1937 were reduced as a result of this change in policy is not determinable.

A further result of the new inventory policy is that changes in pulpwood operating costs at Canadian mills are reflected promptly in current earnings. Under the old inventory policy, changes in such costs were not fully reflected in earnings until the following year, as the seasonal nature of logging operations in Canada makes it necessary for our Canadian newsprint and sulphite pulp mills to maintain large pulpwood inventories, averaging about fifteen months supply.

Corporate Changes

In accordance with action taken at the adjourned annual meeting of stockholders for 1937, the amount carried in capital account in respect of each share of common stock was reduced from $52.50 to $15. This resulted in a reduction of the total capital of the company from $150,433,600 to $112,933,600. Of the amount of the reduction, $26,863,914 was applied to eliminate the deficit at December 31, 1936, and the balance of $10,636,086 was credited to capital surplus.

As of the close of business July 15, 1937, International Paper and Power Company withdrew the offer made in 1928 to issue its own shares in exchange for shares of International Paper Company.

On June 12, 1937, Canadian International Paper Company purchased £200,000 par value of additional common shares of International Power and Paper Company of Newfoundland, Limited, at par. In consideration of the subscription of this additional junior capital the 5 per cent preference shareholders of International Power and Paper Company of Newfoundland, Limited, concurred in action eliminating unpaid back dividends on their shares accumulated since January 1, 1933, and postponing until January 1, 1939, the date on which their shares become cumulative. Cancellation of the back dividends resulted in an increase of $2,017,600 in consolidated capital surplus of International Paper Company and its subsidiaries. As a part of the same arrangement, voting rights of the shareholders of International Power and Paper Company of Newfoundland, Limited, were changed so that control of that company would pass to the preference shareholders at any time when cumulative dividends on the preference shares were in arrears for twelve months after any semi-annual dividend payment date.

Canadian Expert Reports on Southern Pine

C. W. Irwin Returns From South to Study Possibilities of Newsprint Development There—Director of Ontario Research Comments on High Cost Mills—Canadian Paper Box Assn. Meets—To Build New Pulpwood Mill.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., April 25, 1936.—C. W. Irwin, of Toronto, who recently returned from a trip to the Eastern and Southern states, made a special study of the availability of southern pine for newsprint. Mr. Irwin is a graduate of the Faculty of Forestry, University of Toronto, and has given many practical talks over the radio on Conservation and allied topics. He visited the laboratory of Dr. Herty at Savannah and brought home samples of the newsprint which Dr. Herty had made in his miniature paper mill. Mr. Irwin says that this newsprint compares favorably in appearance with much that has been used in Canada and is superior to that at present used by many newspapers in the southern states. Mr. Irwin adds that he was assured by reliable people, who were in touch with the situation, that the long-talked-of Texas newsprint mill is to be a reality in the near future. Until then no one can say that southern pine newsprint will be a commercial success but a group of Texas business men believe it to the extent of five million dollars. Mr. Irwin concludes that "without assuming the role of a prophet, it behooves those interested in Ontario to take stock of the present situation in the province and look toward the possibility of putting the forests of Ontario on a perpetually yield basis."

The Ontario Research Foundation, Toronto, of which H. B. Speakman is director, in a recent official bulletin, referring to the employment of southern pine for newsprint, says that Canadians generally are beginning to show greater interest in a development which cannot fail to influence in several ways the economic, social and political life of the country. Continuing, Mr. Speakman remarks "As research workers it is our duty to pay tribute to the distinguished qualities of Dr. Herty, both of mind and body. Regarded not long ago as a visionary and a theorist, he has lived to see skill in research combined with prophetic insight into the economies of a great industry, receive their reward in large scale industrial development. It would seem unwise if not impossible to attempt any predictions as to what effect these new undertakings will have on Canada. One effect is possible and desirable. The example and the challenge should stimulate liberal support for all wisely planned and efficiently conducted research in the paper field which has in it the promise of the elimination or the use of waste, the reduction in operating costs and the production of superior quality.

"The development of a new and comparatively cheap source of cellulose will no doubt have an effect upon pulp markets generally. At the present time about two thirds of the newsprint consumed in the United States is manufactured in Canada. Just what effect the Southern pine development will have upon Canadian production is of course a question which time alone can answer. It is true, too, that the answer to this question does not depend upon the outcome of Dr. Herty's experiments on newsprint and sulphite pulp although they have been already carried out on a large scale and there is every indication of complete success. One of the effects of the southern pine development might well be that Canadian foresters will now have convincing proof for the urgent need of an adequate conservation and reforestation program in Canada. The trend of raw material costs also emphasizes this need. Even under existing conditions, the South has a definite advantage in lower wood costs. Because of their reforestation measure and the twenty five year harvest principle these costs will remain about the same. In Canada cutting operations are being extended continually to more and more distant regions with corresponding increase in cost of logging and transportation. Already one large Ontario paper mill is idle, because the available timber is too remote for profitable operation. In addition there are several 'high cost' mills which are now situated in comparatively 'logged over' areas and wood costs are becoming out of proportion. As time goes on it will be increasingly difficult to compete with American mills, which, within the next thirty years, will have available a continually increasing supply of trees grown in the United States. However, it is not the intention of this brief article to push Canada completely out of the picture as far as pulp and paper are concerned, but merely to indicate that it is time to 'take stock.' It is hardly necessary to point out many of the exceptional advantages for pulp production in Canada with its tremendous timber assets, water transportation and power facilities, but it is just as necessary to maintain these, as it is for any young flourishing business to set aside a sinking fund for replacing obsolete equipment——. The Publisher of a large London newspaper recently predicted that because of the rapid consumption of spruce in Canadian forests and the absence of adequate reforestation programs the world faces the prospect of a newsprint shortage within a reasonable time.—— Canada can no longer afford to jeopardize one of her greatest industries and her position as one of the world's leading pulp producers. In addition to an adequate conservation program there is need for fundamental research towards the further development and stabilization of the pulp and paper industry."

Canadian Paper Box Assn. Meets

The annual convention of the Canadian Paper Box Manufacturers' Association will be held at the General Brock, hotel, Niagara Falls, Ont., on June 13 and 14. The Association has been advised that there has been a change in the tariff of Southern Rhodesia with the conclusion of the five year trade agreement with Canada. As a result Item 286, all cardboard boxes and cartons, collapsible, plain or printed, now enter that country with a duty of twenty five per cent ad valorem, which is an increase of fifteen per cent.

In the past there have been pulp and paper plants which operated occasionally on Sunday. The Senate,

(Continued on page 69)

Richard J. Cullen Is Honored At I. P. Banquet

More Than 800 Employees Dine At Hotel Pennsylvania, New York, As Tribute To The President Of Company—J. L. Fearing, Vice-President Of Company And President Of Quarter-Century Society Is Toastmaster

More than 800 employees of International Paper Company and its various subsidiaries or affiliated companies were present at a highly successful and enjoyable banquet and dance given in honor of Richard J. Cullen who has been president of the company since 1936 at the Hotel Pennsylvania, New York, Saturday evening, April 23.

History of Mr. Cullen's Activities

A colorful booklet, containing a brief history of Mr. Cullen's activities in paper manufacturing, extending over a period of thirty-six years, told an interesting story of his achievements. Copies of this booklet were placed on the dinner table before each employee. The menu, printed in the booklet, contained numerous delectable dishes appropriately named by experienced paper "cooks." The soup, for example, was "Chicken Hawkesbury Sulphite Soup" in honor of the first pulp plant designed and built by Mr. Cullen at Hawkesbury in Canada. The fish was "Alabama Catfish, H_2S", so-called in honor of the mill built by Mr. Cullen for Southern Kraft Corporation at Mobile several years ago. To Camden, in the State of Arkansas, where Mr. Cullen also built a large kraft plant, was given the privilege of naming the meat course, "Drum-Barked Arkansaw Houn' Dawg."

The banquet was held under the auspices of International's "Quarter-Century Society" (made up of employees in the company twenty-five years or more) and the Employees' Mutual Benefit Association (New York Chapter). The cost of the banquet and everything connected with it was absorbed by the employees themselves as a mark of appreciation for what Mr. Cullen has accomplished for the company and for them.

J. L. Fearing Introduces Speakers

J. L. Fearing, vice president of the company and president of the Quarter-Century Society, was toastmaster and introduced the speakers in jocular vein. These speakers included Irwin L. Moore, president International Hydro-Electric System; H. R. Weaver, Treasurer of International; Major John H. Friend, vice president Southern Kraft Corporation; and John H. Hinman, president Canadian International Paper Company. Before introducing President Cullen—the Guest of Honor—Mr. Fearing retired from the speakers' table to return dressed as an Indian Chief "Firing - Water", accompanied by two braves, "Superoto" and "Dun-Owl" (Walter Shorter and Joe Anastasio.) He then recited a saga composed by him (with apologies to Longfellow's "Hiawatha") outlining International's history, beginning with the various Indian Tribes of "Pulpers" that finally got together in 1898 and carrying the story along through the forty years of International's existence. The names of past-presidents and other active officials and employees of the company were mentioned in the poem, one verse of which was devoted to those who had gone to the "Happy Hunting Grounds." The saga closed with the following words:—

> From the Spruces of the Northwoods
> From the Pine-Groves of our Southland
> Sound the lusty Cheers of Tribesmen
> To the tops of Highest Mountains
> Here's to you, Chief Hawkeye Cullen
> FROM THE HEARTS OF YOUR EYE-PEE'K-OH!

Mr. Cullen Expresses Appreciation

Chief "Firing-Water" then placed an Indian Sachem's headdress on Chief Hawkeye (President Cullen) who then addressed the gathering in simple language telling them how much he appreciated the tribute being paid to him by the employees of the company and modestly declaring the progress made under his administration has been due in large part to the cooperation received from everyone. Mr. Cullen expressed the opinion that with a continuance of this cooperation and with the return of reasonably good times the company would go ahead in a sound and satisfactory manner. At the close of his address he received a long ovation.

Quarter-Century Society Presents Token

The Quarter-Century Society then presented, as a token of its own special appreciation for Mr. Cullen's friendly interest in its organization, a water-color showing Mr. Cullen's home and gardens at Bastrop, La., with Mr. and Mrs. Cullen gazing at the evening sky from their lawn. In the water-color the sky was studded with bright stars, each of which was designated by one of Mr. Cullen's achievements. The full moon, seen above the horizon in the background, was labeled "International" and a bright comet sailing through the sky represented "Southern Kraft."

Czechoslovak Paper Mills Busy

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 27, 1938—A majority of the Czechoslovak pulp and paper mills worked at capacity during the first three quarters of 1937, and some of them were obliged to refuse rush orders because they were unable to make deliveries at the time specified. This was particularly true during the first six months of the year, when customers had hastened to replenish their stocks before the announced increases in pulp and paper prices became effective. During the last few months of the year a decline in the volume of domestic and foreign orders caused a slackening in operating activities. While this recession was partly of a seasonal nature, it also reflected the prevailing economic uncertainty and depressed state of the international market.

Employment in Wisconsin Mills Declines

Director of State Public Welfare States Reduction in Employment Most Drastic in Recent Years, Though Upturn is Expected — American Foresters Meet—Dr. Barrow Talks on Paper Institute — Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 25, 1938.—Curtailment of employment in the paper mills of Wisconsin has been more drastic than at any other time in recent years, according to a statement issued last week by P. D. Flanner of Madison, Wis., director of the state public welfare department. The situation is typical of many other industries, he said, due to a falling off of orders and curtailment of production. Only a small portion of the mills have been able to retain full employment schedules, and some are on a half shift basis in order to distribute the available work.

Paper mill equipment plants also have been affected adversely by the business recession. Expansion and improvement programs have been deferred by many mills until conditions improve. This is quite a contrast to a year ago, when orders were plentiful for newer and more efficient equipment.

Some upturn is looked for during the coming months, but the recovery is expected to be slow and irregular.

Employees laid off in some of the mills and machine plants have benefited by unemployment compensation, since Wisconsin was the first state to pass such a law, before one was enacted federally, and sufficient reserves were accumulated to give the workers the maximum benefits to which they are entitled. The average number of workers receiving checks during February and March was 42,000 for the entire state.

New Starch Sizing Patent Granted

Dr. Ben W. Rowland, research associate at the Institute of Paper Chemistry, Appleton, Wis., has been granted a patent at Washington on a new method of the starch sizing of paper. He was associated in the design with Jordan V. Bauer of Chicago.

The method involves the adding of a tough starch, dispersed in an alkaline solution, and precipitating the starch upon the paper fibre through the addition of an acid material. The application was made in June, 1935, and is approved as to five claims. A Chicago corporation has been assigned the commercial rights.

Society of American Foresters Meet

Papers and discussions on pulp wood problems were presented at a meeting of the Wisconsin section of the Society of American Foresters Thursday, April 21, at the United State Forest Products Laboratory at Madison, Wis.

John E. Alexander, president and general manager of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., acted as toastmaster at an evening banquet. The speakers were R. H. Fischer of the Wisconsin Conservation Commission, and Earl W. Tinker, regional director of the United States Forest Service. Stanton W. Mead, treasurer of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., spoke on "What Industry Is Doing to Perpetuate Forests." His talk was based on the reforestation operations carried on by the Consolidated company.

A paper on control prepared by W. E. Brooks, manager of the Wisconsin Valley Improvement Company, was read at the meeting in his absence. A part of the discussion was devoted to the pulp wood sources of supply.

Two way portable radios are being used in a test program in northern Wisconsin and Michigan to report forest fires, according to E. J. Vanderwall, chief forest ranger. They have been found effective in communicating with lookout towers and bring about prompt extinction of small fires. Application has been made to the Federal Radio Commission for assignment of wave bands, and equipment will then be purchased for all rangers. The sets are found to be effective for 100 miles, and weigh less than 80 pounds.

More than 230 fires were reported in Wisconsin forests last week but most of them were checked with very little timber loss. Recent rains have minimized the danger for the present.

Dr. Barrows Talks on Paper Institute

Rapid growth and functions of the Institute of Paper Chemistry, Appleton, Wis., were described by Dr. Thomas N. Barrows, president of Lawrence College and director of the Institute, in an address before the Rotary Club of Kaukauna, Wis., last week. Dr. Barrows said the Institute was started in 1930 with three students and a staff of five, and now has 44 students and a staff of 85.

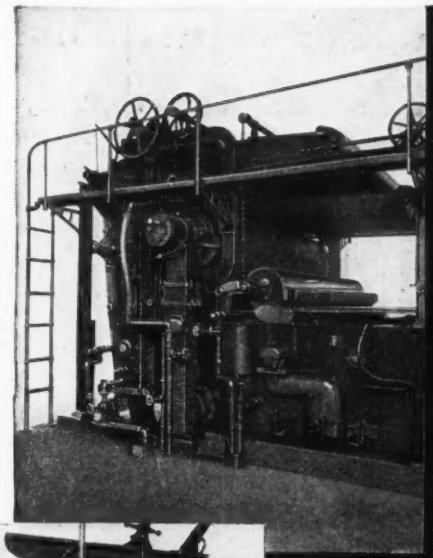
Sixty-two companies operating more than 300 paper mills are now members, he said, and the annual budget has grown from $40,000 to $300,000. The value of buildings and equipment is $800,000.

Dr. Barrows said that while the Institute is used by numerous concerns on research problems, this practice has not given way to private research by corporations.

The Institute has no endowment and wants none, the speaker said. He explained they must not lose sight of their dependence on industry for survival. With an endowment, the tendency is to place the theoretical ahead of the practical. A corporation school has only the economic and practical in view.

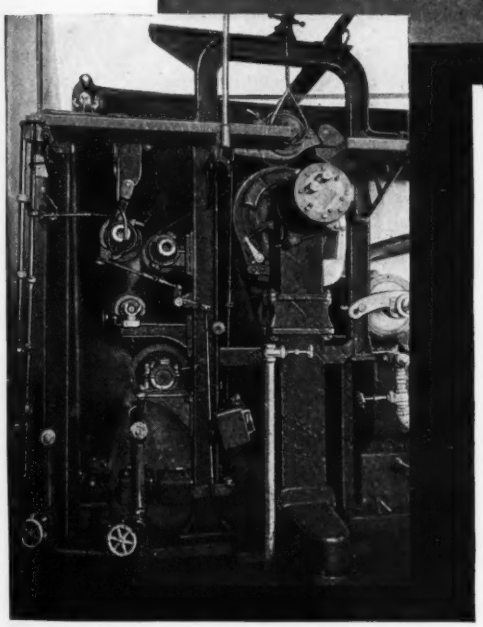
F. J. Harwood Honored on Anniversary

F. J. Harwood, president of Appleton Woolen Mills, Appleton, Wis., was honored for his long service at the fiftieth anniversary banquet of the Appleton Y. M. C. A. last week. Mr. Harwood was president when the Association was organized in 1888. The organization functioned until its building was destroyed by fire in 1893, and then was forced to give up until 1913, when a new building was erected. The twenty-fifth anniversary of the new organization also was celebrated. Mr. Harwood served as president of both organizations until a few years ago, when he retired.

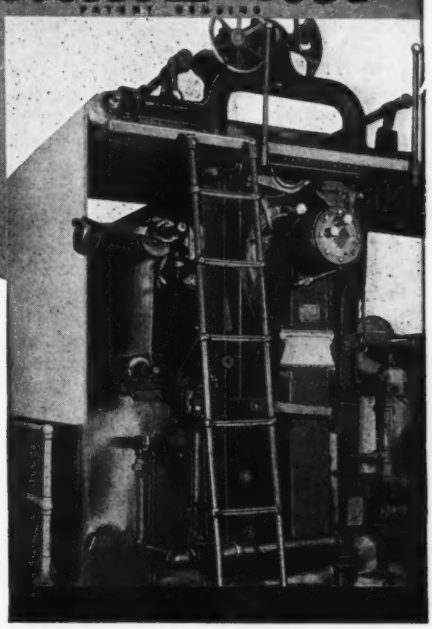


BELOIT SUCTION Drum Press

PATENT PENDING



Results: Equivalent to suction drum and suction primary press combined



An absolute necessity on every board machine

Superior to all other methods of water removal on wet felts. • There must be a reason for over thirty of these rolls.

Ask the mills who installed them.

THE BELOIT WAY BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS **IS THE MODERN WAY**

BELOIT IRON WORKS, Beloit, Wisconsin, U. S. A.

Canada Concerned About Newsprint Situation

Premiers Duplessis and Hepburn Meet to Discuss Common Policy in Pulp and Paper Industry—Continuation of Present Rate of Operations Will Curtail Forest Cut 40 Per Cent—Howard Smith Mills—Other News.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., April 25, 1938.—During the week Premier Maurice Duplessis visited Toronto for a conference with Premier Mitchell Hepburn, the object being to discuss various matters in which the provinces of Quebec and Ontario are jointly interested, and in particular to discuss a common policy in respect to the pulp and paper industry. The depressed state of the newsprint industry is causing concern in both provinces. It is calculated, for instance, that if the consumption of newsprint continues at the present level it will result in a curtailment of the cut in the Quebec forests of 40 per cent compared with the cut last winter. This would be a serious matter both as regards employment and as regards provincial revenue. On his return to Montreal at the end of the week Premier Duplessis declined to give out any information as to his conference with Premier Hepburn, though he left the impression that co-operation between the two provinces had been still further advanced.

Newsprint in British Honduras

According to government advice from British Honduras, the government of that colony has announced that as from February 15, 1938, it is prepared to allow a refund of any duty paid on newsprint and paper used for the printing of newspapers, on application being made by the importer and supported by a statutory declaration by the newspaper firm that the paper has been wholly used in the printing of newspapers.

Newsprint is dutiable in British Honduras at 10 per cent ad valorem British preferential tariff (applicable to Canada) and 20 per cent ad valorem general tariff (applicable to all countries outside the British Empire).

Howard Smith Paper Mills

At the annual meeting of the Howard Smith Paper Mills, Limited, held here, Harold Crabtree, the president, told shareholders that business in the first quarter of the year was somewhat below that of the previous year. He pointed out that while demand for all grades of pulps is exceedingly light at the present time owing to the decline in demand from the United States, the chief market, it is believed that this situation cannot be of long duration. The company is in a position to benefit from any upturn in business now that the major portion of the extentions undertaken have been carried out.

The increase in production has made available for sale in the open market about 200 tons of high-grade paper pulp per day, comprising bleached graft, bleached sulphite and bleached soda. Improved efficiency and quality have resulted from the extensions.

Continuing, Mr. Crabtree stated: "The pulp and paper business, and I believe it is no different in this respect to any other manufacturing business, requires a great deal of money to be spent on upkeep and renovation of plant from time to time in order to protect its earnings, keep its position in the industry and maintain an economical balance between production and demand. This applies not only to its manufactured product, but also to its supply of pulpwood, the consumption and the forces of destruction are making tremendous demands on our forests, a situation to which the provincial governments will have to give serious attention if Canada's greatest industry is to be maintained and provision made for its natural growth."

Directors were re-elected.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 27, 1938—The Government Printing Office has received the following bids for 25,350 pounds (150,000 sheets) of 28 x 41 dull coated book paper in cases; Federal Paper Company, 7.70625 cents; Mathers-Lamm Paper Company, 7.37 cents; Walker, Goulard Plehn Company, 7.35 cents; Old Dominion Paper Company, 7.84 cents; R. P. Andrews Paper Company, 7.6 cents; Stanford Paper Company, 7.7 cents; Whitaker Paper Company, 7.4 cents; Barton, Duer & Koch Paper Company, 7.37 cents; Reese & Reese, Inc., 7.52 cents; Enterprise Paper Company, 7.4 cents.

For 5,000 pounds (52,000 sheets) of 25 per cent rag, white antique M. F. cover paper; Reese & Reese, Inc., 12.96 cents; Walker, Goulard Plehn Company, 10.09 cents; R. P. Andrews Paper Company, 10.07 cents; Whitaker Paper Company, 9.92 cents; and Stanford Paper Company, 10.1 cents.

For 2,500 pounds (26,000 sheets) of 25 per cent rag, rag antique M. F. dark brown cover paper; Stanford Paper Company, 10.1 cents; R. P. Andrews Paper Company, 10.07 cents; and Walker, Goulard Plehn Company, 10.09 cents.

Peavey Paper Products Mill Closed

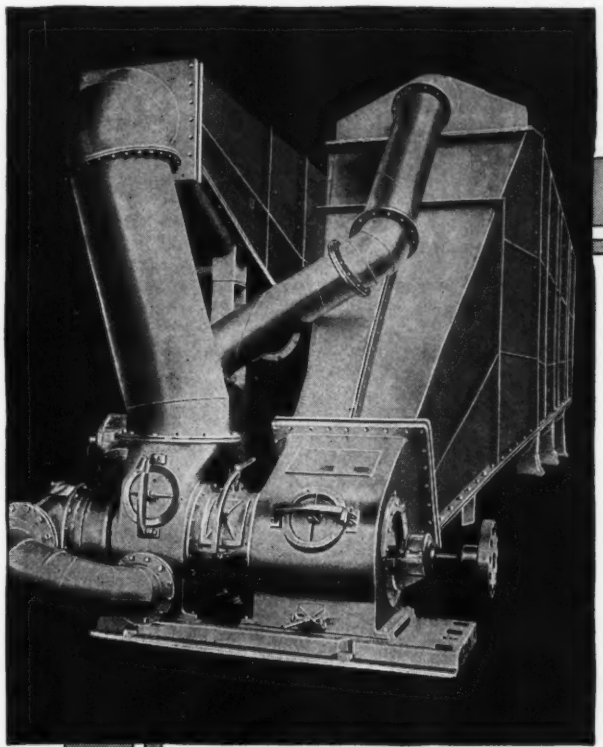
[FROM OUR REGULAR CORRESPONDENT]

LADYSMITH, Wis., April 18, 1938.—Peavey Paper Products Company closed down its mill Wednesday of last week for an indefinite period. All of the men have been laid off, and permission will be sought from insurance companies to withdraw the fires from the boilers.

William Peavey, president and general manager, said the present business recession and several months of unprofitable operations were responsible. Operations will be resumed just as soon as conditions appear favorable. Considerable repairing and overhauling of machinery will take place in the meantime.

The Peavey mill had operated steadily for the last five years, and the peak of its employment a year ago was 175 persons. In recent months, the force was reduced to 150. Ground wood book, tissue and specialties have been produced.

Meet the New Tugboat Annie



Just because Tugboat Annie is miles ahead of other pulpers is no reason for her to rest on her oars. No sir, not Annie. Instead, she has undergone a design improvement that will enable her to send an even greater golden stream of savings flowing into company coffers.

The recent improvement referred to is a new stock by-pass arrangement. As one can see from the illustration, the stock used to submerge newly charged pulp laps goes direct to the overflow rail instead of taking the same path as the stock sent back for recirculation. This was made possible by designing a special impeller which efficiently pumps both streams of stock. Added savings on power result.

It is true that this isn't a major change, but, nevertheless, it is in line with Shartle policy of "forward march". In other respects, Tugboat Annie is still the same old pulping fool. She's still so good that one pass and pulp laps are reduced to the size of quarters. 10,000 healthy wallops a minute is the reason . . . 10,000 healthy wallops a minute despite only one moving part.

Tugboat Annie is a modern industrial amazon. She's literally the answer to a mill man's prayer for a machine that would pulp fast, uniformly and thoroughly. No wonder Annie has attracted more attention than any other paper mill machinery development in the last decade. We're happy to say that this interest has been followed by orders and that seventy are now in service throughout the world.

You, too, can put Annie to work in your mill saving plenty of money. Consider her not only for unparalleled pulping, but also for bleaching and deinking. Shartle Brothers Machine Co., Middletown, O. Division of the Black-Clawson Company.

SHARTLE BROTHERS

Chicago Industry Reports Better Business

Many Grades of Paper in Good Demand as Waste Paper Trade Declines to Lower Level—Commission Rules on Freight Rates—Wall Paper Institute Sponsors Exhibit—Unemployment Regulations—Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., April 25, 1938.—Easily the most disappointing picture in the local paper market is the continued demoralization of the waste paper industry. In certain grades of waste paper there seem to be absolutely no "takers" and the market is thus bumping along in such an uncertain way that a prediction of basic prices seems almost impossible. All grades are reported to be in about the same unfortunate position with dealers, in some cases, being paid to cart away the waste paper supply. Aside from the condition in the waste market the local paper industry seems to be doing a pretty fair job. In certain lines, such as sulphites, buyers seem to be making hay while the sun shines and taking full advantage of recent productions. In the book markets it is reported that better buying is in evidence as buyers seek to avoid an upward trend obviously in the near offing. Kraft papers are holding at firm points with demand showing indications of improving. Newsprint and groundwood markets showed little change during the week. The board industry, particularly grades used in the building fields, showed evidence of a marked appreciation in demand.

City Sales Taxes Cause Apprehension

Chicago paper merchants and manufacturers as well are breathing a sigh of relief that they are not under the sales tax handicap now imposed upon Philadelphia merchants by the 2 per cent city sales tax of that city. The situation in the eastern metropolis is assumed to be the position of Chicago business men had revenue measures up before the last session of the Illinois Legislature not been withdrawn. The Illinois proposed statutes would have given the city council of Chicago the right to license for revenue purposes and there was behind the bill the reputedly obvious attempt to pave the way for a sales tax levy in addition to the 3 per cent State Occupation tax now in effect. However, there are reports that efforts will again be made to pass enabling legislation of this type early in 1939 and Chicago paper executives are watching closely the effect of the Philadelphia levy which is reported to have worked a very definite hardship on Philadelphia merchants competing with those just outside the city limits. The tax has also, rather unexpectedly it seems, played havoc with Pennsylvania sales of Philadelphia retailers, manufacturers and wholesalers because of its stringent provisions pertaining to retail sales from Philadelphia and in intrastate shipment.

Commission Rules on Freight Rates

Of more than ordinary interest to local paper concerns is the report that certain tariff rates on less-than-carload paper merchandise from Appleton, Menasha, Neenah and Fond du lac to Chicago are in violation of the long-and-short haul rule and that the 22 cent rate is a part of this violation. W. A. Disque, commission examiner, recently considered a case wherein a trucker charged that the 22 cent rate was unreasonably low as compared to the 27 cent truck rate for the 92 mile distance between Milwaukee and Chicago. The fact that Milwaukee is intermediate to the points in the Fox River Valley with all facilities for handling is reported to have weighed in the examiner's decision. The defendant, the Northwestern Railroad, stated that while the rate was below a reasonable maximum it was necessary as a business proposition and not below a reasonable minimum.

Wallpaper Styles Exhibited

Wallpaper, an important consumer of paper, was on parade in Chicago this week with the annual wall paper style show sponsored by the Wallpaper Institute and held at the Congress Hotel. Twenty three model rooms, each illustrating new trends, were open to the public and visitors found wallpapers now designed to please blonde housewives, brunettes and even red heads. Ensembles, companion papers for the living room, dining room and hall, drew the attention of wall paper men while appliqued roosters, sheep and Alice in Wonderland figures delighted the youngsters—as well as the blackboard wall paper which can be scrubbed.

New Sherman Distributors

The Sherman Paper Products Corporation, a Massachusetts concern, has recently announced the appointment of four well known concerns to serve as new distributors for their line of flexible cushion wrappers and kindred products. The Chicago distributor is to be the Schwarz Paper Company while the remaining three concerns are to be the Chatfield Paper Company of New Haven; the Industrial Paper Company of Baltimore and the Redfield-Norcross Company of North Adams, Massachusetts.

Unemployment Regulations Issued

Paper manufacturers, wholesalers and others interested in the Illinois Unemployment Insurance Act as in affects their own employee interests, will be interested to know that the State Division of Unemployment Compensation Insurance has recently issued Regulations 12 which sets up qualifications for stable employers required only to report on separations and also regulations governing the wage reporting on a current quarterly basis. The regulations are helpful in synchronizing Federal and State wage reporting data in a duplicatory way although the requirements for stable employers are perhaps sufficiently stringent to eliminate the possibility of any paper companies qualifying. One of the qualifications is that the employer must, in the preceding 12 months, have kept at least 70 per cent of the maximum number of employes employed full time for the 12 month period and another requires that the annual sum of the percentages of monthly turnover must not exceed 70 per cent per year during the two years preceding the application.

Courtesy Forest Service, U. S. D. A.

A stand of Longleaf Pine near Thomasville, Ga.

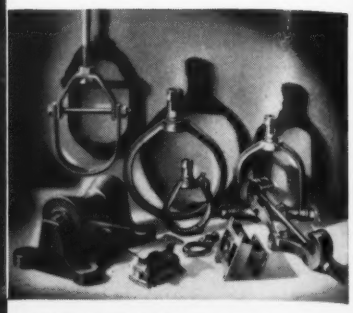
Four of the New Mills In The South

Described and Illustrated

St. Joe Paper Co.	**Port St. Joe, Fla.**
Brunswick Pulp & Paper Co.	**Brunswick. Ga.**
Chesapeake-Camp Corp.	**Franklin, Va.**
Container Corp. of America	**Fernandina, Fla.**

By Reginald Trautschold

Engineering Consultant



EASY ADJUSTMENT during and after pipe erection is a feature of Grinnell Adjustable Pipe Hangers, made in a complete line to hang any piping any place. Quickly installed, providing easy maintenance, they make full provision for expansion and contraction.

ONE WELD OR A HUNDRED are easily made with Grinnell Welding Fittings. With properties identical to those of the pipe itself, they weld easily; limit welds throughout the system to the plain circumferential type which are superior in strength and simplicity.

INSTEAD OF "FIELD-BUILT"

. . . For Speed . . . Economy . . . Simplicity

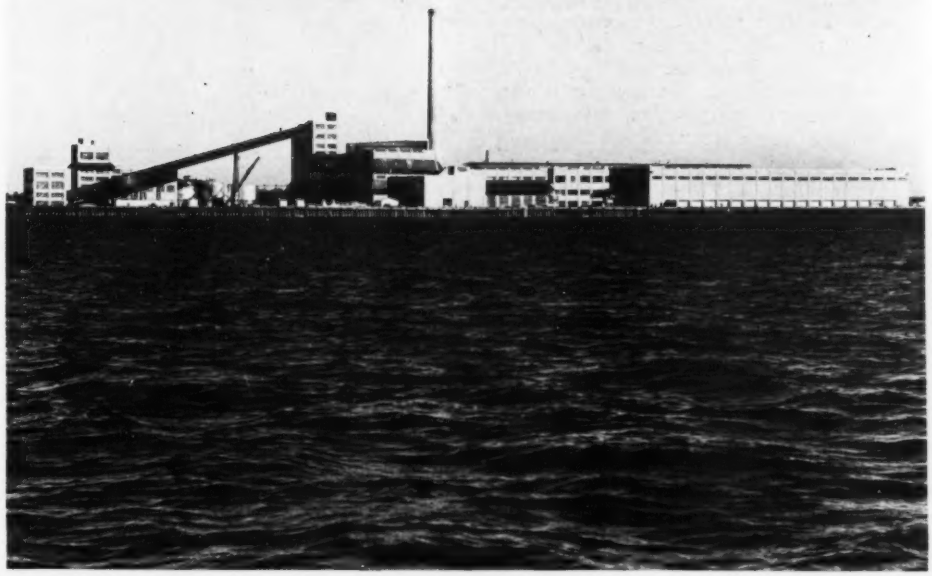
More and more, engineers responsible for important power and process installations are turning to Grinnell Prefabrication. These engineers have learned to depend upon Grinnell for delivery of piping systems in the form of carefully-engineered sub-assemblies, easily and economically erected.

Grinnell offers unequalled facilities for this important work. Three complete plants, strategically located, are supplied with equipment which *cannot be made available in the field:* layout tables, form cutting machines, preheating and stress-relieving equipment—plus the exclusive Grinnell hydraulic extruding machines which make extruded outlets, limit field welds to the plain butt type.

Specialized piping experience enables Grinnell to contribute basic and interpretive engineering; to assure sub-assemblies that are commercially practical. Grinnell-prefabricated units, pretested to qualify for insurance, and delivered on schedule, are easier to use, and provide a better piping system. Grinnell Company, Inc., Executive Offices, Providence, R. I. Branch offices in principal cities.

PREFABRICATION BY GRINNELL

WHENEVER PIPING IS INVOLVED



Saint Joe Paper Company

Port St. Joe, Florida

"Gentlemen, you are looking at the finest harbor on the Gulf and at the finest paper mill in the land." These were the words spoken at the site where the first constitutional convention of Florida was held in 1838, at old, ill-fated St. Joseph, by Pierce Wood, vice president and manager of the Apalachicola and Northern railroad, when welcoming Senator Charles Andrews and party last October. The occasion was the senator's first visit to the brand new and thriving industrial town of Port St. Joe, now destined to play a leading role in paper making.

The immense St. Joe Paper Company plant, which entailed an investment, by the combined Mead and Almours Securities Inc. interests of about $7,500,000, now stands ready, at this key position of the great southern, hat-shaped, longleaf and slash pine arched belt area, to reestablish and far outstrip in industrial importance the high-ranking, as a commercial and shipping port, held by the old town prior to the devastating yellow fever purge of 1840-1841. The centennial celebration of the historic spot centers about the starting-up of the great paper making undertaking.

With the pine belt of the Gulf extending from the tip of Florida to a little beyond Pensacola on the west, a distance roughly of 350 miles, in almost the exact middle of which stands the mill with a wide deep-water channel from its docks to the sea, the 60,000 square miles or more of southern pines centers on Port St. Joe like a giant enveloping hat, so that the attention of the entire pulp and paper industry is at present directed on this great new plant, designed by George F. Hardy and erected by James Stewart & Company.

The towering 13-foot inside diameter, 22 feet 4¾ inches outside diameter at the bottom, brick stack, dispersing the gases from the soda recovery furnaces and the products of combustion from the oil and wood waste fired boilers 250 feet in the air, provides an eye-commanding measure of the magnitude of the power plant serving this vast plant, of a power plant which embodies the most advanced in steam generating and power distributing equipment. The boiler equipment consists of two special oil-and-bark-fired integral-furnace B&W boilers with Hofft furnaces and feeder, one similar steam generator fired on oil only and three B&W-Tomlinson recovery units, operating on concentrated black liquor. All six of these steam generators are designed for a pressure of 650 pounds per square inch and will operate at 615 pounds.

Combustion Control and Steam Distribution

The handling of this great steam output, aggregating close to three-eighths of a million pounds of high-pressure, super-heated steam per hour, when all steam generators are in service, is under a highly developed system of sensitive automatic control. Bailey metering and control equipment governs the efficient combustion of the fuels and also the distribution of the entire steam output.

Each of the power boilers is equipped with a boiler meter which indicates, records and integrates the steam flow, records the air flow to the boiler furnace and records the temperature of the superheated steam. A multi-pointer gage indicates the preheater inlet and outlet air pressures and the furnace, uptake and preheater outlet drafts; and

a recorder registers the flue gas temperatures at the preheater inlet and outlet and the air temperature at the preheater outlet.

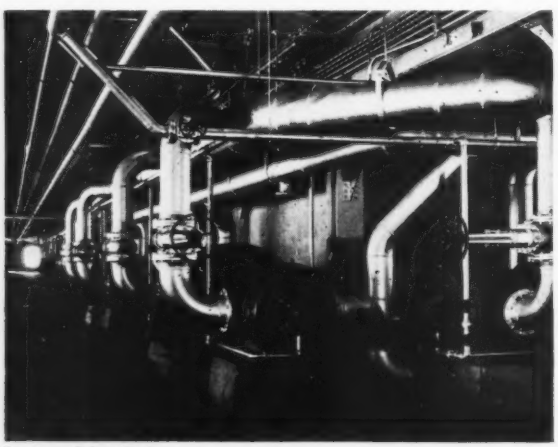
A master steam-pressure recorder-controller posts continuously the steam header pressure and a feedwater meter records and integrates the flow to the power boilers and records the feedwater header pressure. A similar instrument records and integrates the feedwater flow to the recovery boilers.

These latter steam generators are provided with black liquor boiler meters which indicate, record and integrate the black liquor flow to the respective units, record air supply flow and post the black liquor nozzle supply pressure. A steam flowmeter integrates the steam flow from the recovery units and records both the heated air and exit gas temperatures. A recorder posts the steam pressure, steam temperature and the heat of the feedwater; while a multipointer gage indicates the forced and furnace drafts, differential pressures through the boiler and through the air heater, and the draft at the induced fan inlet. Bailey thermo-hydraulic feedwater regulators and automatic furnace draft control are also provided.

The distribution instruments include Bailey fluid meters for recording and integrating the steam flow, also recording steam pressure and temperature, to the two turbines and for recording and integrating the steam flow supplied to the main pressure reducing valve. These meters are on the high (600-615 pound) pressure steam lines. Fluid meters likewise record and integrate the steam extracted at 125 pound pressure from the high pressure taps on the respective turbines and others record and integrate the steam extracted from the low pressure taps at 50 pounds.

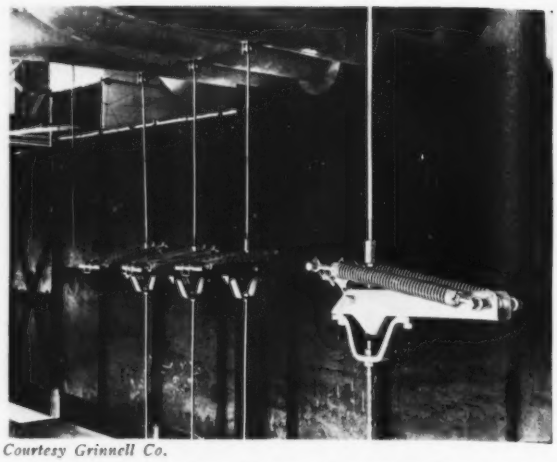
The supply of 125-pound, 50-degree superheat, steam to the plant's four great digesters is recorded and integrated by a meter and a similar instrument records and integrates the steam supplied for the operation of the plant's auxiliaries. The steam supply to the feedwater heater, from the low pressure taps of the turbines and that, after pressure reduction, from the desuperheater in the 125-pound line, is recorded and integrated by another Bailey fluid meter.

The 50-pound, 50-degree superheat, steam supplies to the paper machine, evaporators and causticizing tank of the chemical recovery plant are similarly recorded and integrated by instruments. A meter records and integrates the rate of boiler feed make-up water flow, while meters record and integrate the flow of condensate from the surface condensers. A Bailey fluid meter records and integrates the rate of flow of weak black liquor supply to the evaporators and a similar instrument posts like findings in respect to the well water supply.



Courtesy Grinnell Co.

PIPING FOR THE COUCH PIT VACUUM PUMPS IN MACHINE ROOM BASEMENT.



Courtesy Grinnell Co.

COMPENSATING GENSPRING HANGERS SUPPORTING THE BOILER LEADS FROM THE THREE POWER BOILERS.

All these eighteen Bailey fluid meters, together with a condensate flow control valve, a pressure controller for the main steam pressure reducing valve, a somewhat similar instrument for the 50-pound steam header and Bailey hand-automatic selector valves for the main pressure reducing and the 125-50 pound steam pressure reducing valves respectively, are mounted upon a centrally located distributing meter panel. Other of the Bailey process control equipment includes that for the desuperheater, with steam temperature control; recorder-controller which records the desuperheater steam temperatures at both inlet and outlet; hand-automatic selector valve for the condensate flow control valve; an interlock in temperature recorder-controller which automatically closes the main pressure reducing valve if the temperature of the desuperheated steam should become excessive; and a steam pressure reducing valve in the line from the desuperheater, 125 pounds, 50 degree superheat, to the 50-pound, 50-degree superheat, supply required for the feedwater heater, paper machine, evaporators and causticizing tank.

The large amount of piping and the many valves entailed in this comprehensive distribution of steam to every department of the plant was installed by the Grinnell Company, in accordance with Hartford specifications, as was also the well-planned sprinkler system. All high pressure piping is supported by compensating Genspring hangers, such supports being used for the steam piping from, not only the three power boilers and three recovery units, but on the steam turbine leads. Even vertical pipe sections are held by these distinctive hangers to support the lines throughout the travel caused by expansion and contraction.

The majority of the process piping and most of the high pressure steam and boiler feed piping connections are welded, and all welds annealed. Wherever flanged joints have been necessary, plain soft steel gaskets and Class C bolting material are used, each stud being tightened to a given, micrometer determined, stress. At times a piping crew of 135 men are

said to have worked on the job and, thanks to the exacting precautions taken, especially on the high-pressure piping, the plant started-up without a single leak developing on any of the countless joints—a record rarely attained.

All of the power plant piping insulation, that of the chemical recovery plant, the two large G. E. turbines and other steam equipment was expertly done by Guy M. Beaty, using Carey Hi-Temp insulation on all superheated steam lines and equipment and 85 per cent magnesia covering, with an outer layer of Hi-Temp insulation on all other lines and equipment. As a further protection, where pipe or equipment is exposed to the weather or to rough usage, a jacket, or coating, of Thermo-tex has been applied to protect the insulation.

Turbines and Generators

Two G. E. double automatic-extraction, condensing turbo-generating sets, provided with direct connected exciters, furnish the operating power for the entire plant. The steam flow from the great turbines, which exhaust at 1-pound absolute pressure to Wheeler surface condensers, is so arranged that while the plant is operating normally the highest possible economy in the balance between power and steam consumption is maintained. That is, the turbines are equipped with three-arm mechanisms by which the speed governor, steam admission valve and both extraction valve gears are interconnected, so that changes in load or fluctuations in steam requirements in either extraction line are automatically kept in balance. Thus, any inefficient hunting on either of the lines is avoided and constant speed is maintained under all conditions of load or extraction pressure.

The kva. rating of the turbo-generator sets is taken full advantage of for the wide utilization of G.E. synchronous motors throughout the plant. Most of the G.E. motors in the plant are of sufficient capacity for high-voltage operation and these motors are furnished with cubicle-type controls of the full-voltage, oil circuit-breaker variety.

The controls are arranged in load centers so grouped as to provide proper supply from the feeder circuit-breakers and still be located advantageously for the distribution of power to the various motors they serve. Each of these cubicle controls includes interlocked disconnecting motor switches to prevent motor operation while the circuit-breakers are closed and all of the high-voltage, alternating-current control panels, of which there are seventy, provide for indicating and recording meters.

The many general purpose G.E. induction motors range in size from 400-horsepower down to fractional horsepower units, and in construction from completely enclosed motors to those of splash-proof, fan-cooled and standard open types. All motors located where the atmosphere is damp or where moisture may get into the motor windings from any cause whatever are of approved splash-proof construction. Where low speeds of operation are required, built-in gearmotors are used and where these units are subjected to wet conditions, splash-proof features are built into the gear parts of the combinations.

An enclosed cubicle type of switchgear, with manually operated feeder circuit-breakers, is used for the mill circuit, the generators being regulated by direct acting rheostat voltage regulators, avoiding vibrating contacts in voltage adjustment, and all the switchgear is completely enclosed, with recording meters, including wattmeters and frequency meters, well provided for keeping a continuous register of mill performance. Then, there is, of course, the great cubicle-type switchboard controlling and governing the operation of the entire plant.

Wood Handling

Turning now to the mill functions and operations, a simple, yet comprehensive and flexible, system of conveyors—chain, apron and belt types, handles, with the aid of a conveyor type barge unloader and two elevators, the logs, bark and chips required to keep the great plant running. In all, there are sixteen Jeffrey carrier units which aggregate in length close to half a mile.

The pulpwood logs feeding the establishment come by rail, truck and barge. Those arriving in railroad cars or in trucks are handled over a distance of 556 feet, by two conveyors, a horizontal yard conveyor and an inclined carrier which delivers the logs to two great barking drums; while those received by water reach the barking drums, over a conveyor line. This barge line is made up of a Jeffrey, hinged-conveyor, barge unloader, a dock conveyor with an elevating and a horizontal section and a shuttle conveyor reaching to the barking drums.

The boom of the barge unloader is arranged so that it can be swung into a vertical position to clear barges at the dock and raised or lowered to conform to the tide level. The shuttle conveyor, which runs in and out from beneath the horizontal section of the dock conveyor, is of sufficient length to serve additional barking drums when and if they are added.

From the barking drums, the logs are carried by an inclined conveyor and discharged through a bifurcated chute to either of two large Carthage Machine Company chippers, while two apron conveyors under the barking drums discharge the loosened bark to a belt conveyor feeding a bark shredder. The chips from the Carthage units are carried to the screens by two Jeffrey, centrifugal discharge, elevators. The oversize chips, rejected by the screens, are transported by a short belt carrier to a re-chipper, or Murray crusher, while the accepted chips are carried to the digester house by a long belt conveyor. From this latter conveyor, a short belt leads to a shuttle conveyor by which the surplus chips are placed in storage.

The two large, dry type, barking drums are 12 feet in diameter by 45 feet in length, made in two shell sections of longitudinal U-bar 22½ feet in length welded to heavy channel rings, with a single 150-horsepower motor driving each of the assembled drums. The two sections of the individual drum units are suspended in four heavy alloy-steel chains and are driven by a similar chain from a common drive shaft. These were built by the Chicago Bridge & Iron Company for Fibre Making Processes, Inc., as were also the substantial supporting frames and the vats beneath the drums.

Digester Building

The four sulphate digesters, installed under the chip storage bin, 12 feet in diameter by 45 feet 4 inches in height, were built by the Chicago Bridge & Iron Company in accordince with Paragraph U-69 of the *A.S.M.E. Code for Unfired Pressure Vessels*—x-rayed and stress relieved. Each digester will take a charge of 4,300 cubic feet of wood chips and each is equipped with a F.M.P. strainer at mid-section through which the liquor is drawn, passed through a

heat exchanger and discharged to the bottom and top of the digester by the unit's circulating pump. In this way, there is no dilution of the liquor by steam condensation.

The blowsteam from the blow tank, built by the Hammond Iron Works, is condensed in a specially designed F.M.P. condenser from which the contaminated hot water passes to an accumulator, of butt welded construction, built by the Chicago Bridge & Iron Company. The condenser, incidentally, was also fabricated by the Chicago concern of ⅜-inch plate welded construction.

The hot water pumped from the top of the accumulator through three Rosenblad spiral heat exchangers is utilized to heat clean cold water for washing purposes and the cooled down, contaminated condensate goes back to the bottom of the accumulator, from whence it is repumped to the condenser for service in condensing the steam. This flow of the cooled condensate back to the condenser is regulated automatically, so that the temperature of the hot condensate from the condenser is kept constant.

Chemical Recovery

The weak black liquor efflux from the washing of the cooked pulp is concentrated in a giant, six-body, quintuple effect, Swenson evaporator to a concentration of 55 per cent total solids. To this strong black liquor, the salt cake is added and the mixture burned in the three large, steam generating, recovery units of the plant, where the recoverable chemicals in the black ash melt and are then taken to the caustic plant. Here, the reclamation of lime mud and green liquor is effected and sufficient white liquor produced to cook—by a continuous Dorr causticizing system.

This method of chemical recovery, which has now become quite general in most modern, well-operated plants involves:

1. Lime (calcium oxide) handling.
2. Lime slaking and causticizing.
3. White liquor production and lime mud washing.
4. Clear green liquor production and dregs washing.
5. Lime mud (calcium carbonate) dewatering and reburning.

The system being continuous, these steps, or processes, are correlated and take place simultaneously, yet are quite distinct.

At St. Joe, the fresh lime is carried by a vertical, steel encased, Link-Belt continuous bucket elevator, 17 feet in height and powered by a 3-horsepower motor, which is capable of handling lime in lumps not over 6-inches in size at a rate of 15 tons per hour. This elevator feeds an American Pulverizer Company 24-inch by 18-inch ring crusher, to break up the large lime lumps, or delivers direct to a centrifugal discharge Link-Belt bucket elevator carrying the pebble lime to fresh lime bin. The elevator handling the new pebble lime is 65 feet in height and discharges to a 12-inch horizontal Link-Belt screw conveyor, 20 feet in length, which, in turn, charges the storage bin at the rate of 15 tons of lime per hour. A 5-horsepower back-geared motor drives both the elevator and the screw conveyor through roller chain transmissions.

The lime feeder conveyor discharges to a 6 foot 6 inch cylindrical Kilby rotary lime slaker, 24 feet in length, from which the lime is ejected through a rotary scalping screen that throws out any lumps over ½-inch in size. This slacker discharges to a Dorr bowl classifier, 2 feet wide by 26 feet 7 inches with a 10-foot diameter, where the charge is washed thoroughly with a spray of hot water, in order to salvage all possible lime and solubles, and the impurities—sand, pebbles, unburned cores, etc.—are discarded.

The actual slaking of the lime is consummated by clarified green liquid, some of which is piped into the feed end of the slaker, some pumped into the slaker's discharge screen, keeping the feed chute of the classifier clear, and some fed into the classifier body. A connection is also provided for green liquor feed to the causticizers which follow.

Two milk of lime centrifugal pumps, one serving as a spare, are used for the delivery of 225 gallons per minute of caustic slurry to the Dorr causticizers, from the bowl classifier. These pumps are of the Morris type with nickel castings for shells and impellers. A balance, or overflow, tank with an 18-inch duplex turbo mixer is interposed between the bowl classifier and the causticizers, which in this plant number three set in series, each with a 34-inch open tilted duplex turbo-mixer in a 10-foot diameter by 9 foot deep flat bottomed steel tank. Incidentally, the rotary speed, diameter and type of turbo-mixer have been carefully selected to secure desired caustic conversion without breaking down the carbonate crystals as they form.

From the causticizers, the slurry of liquor and lime carbonate flows by gravity to a four-compartment Dorr continuous clarifying thickener for white liquor, 30 feet in diameter and 26 feet high overall. This unit discharges a continuous overflow of white liquor of maximum clarity, activity and temperature to storage and, at the same time, an underflow of settled and consolidated lime carbonate at maximum density and containing a minimum amount of recoverable white liquor.

The lime mud is withdrawn from this first thickener and pumped to a second Dorr clarifying thickener, the exact duplicate of the first, where it is mixed with weak liquor filtrate and fresh hot water as a wash. The resulting overflow from this second thickener, weak white liquor, passes to storage, for use in the smelt dissolvers, and the settled mud is discharged to a sump, where it is mixed with weak filtrate and then pumped through a turbo-mixer repulper in a tank, prior to being carried by a Nash vacuum pump through a pair of Oliver, caustic type, continuous rotary drum filters, 6 feet in diameter by 4 feet in length, where the final washing and mechanical dewatering of the lime mud is performed.

Since the green liquor required for the slacker, etc. contains, as it comes from the smelt dissolvers, solids that are detrimental to lime utilization and subsequent plant activities, it is clarified in a four-compartment, 30-foot diameter by 26-foot high Dorr thickener, similar to those employed for white liquor clarification. The overflow from this green liquor unit, the system being continuous, is heated in a tubular steam heater and then, from an insulated storage tank, is repumped into the system—to the slacker, classifier and causticizers.

The settled dregs are pumped from this green liquor clarifier to a four-compartment Door washing thickener, 20 feet in diameter by 26 feet high. These compartments of the thickener are arranged in a series of steps and a continuous stream of fresh hot water entering the lowest step passes up through the other three washing steps and emerges from the top of the thickener as weak green liquor. This overflow discharge is added to the weak white liquor

stored for use in the smelt dissolvers, while the washed dregs are pumped to waste.

Reburning Lime Kiln

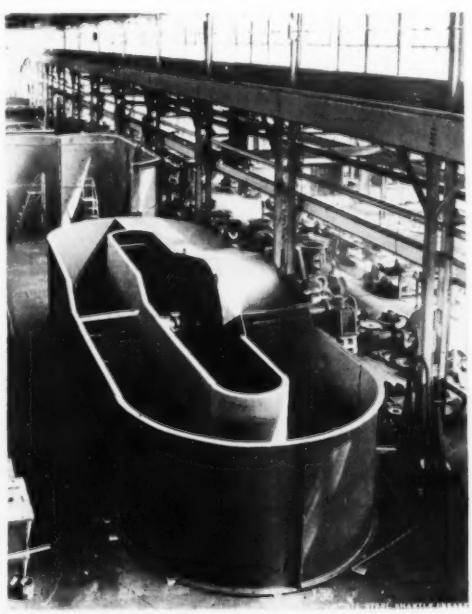
The filter cake from the Oliver filters is fed to a Nichols-Herreshoff multiple hearth furnace, 22 feet 3 inches outside diameter and about 51 feet high, capable of calcinating 200 tons of calcium carbonate sludge containing up to 40 per cent water per 24-hours. This great kiln is equipped with twelve internal hearths and a top drying hearth, with oil burners located on the various hearths. The sludge, or filter cake, is fed to the kiln near the center of the top drying hearth, rabbled across the successive hearths, dropping from one to the other through feed openings, and is discharged from an outlet in the bottom hearth.

The greater part of the firing of this kiln is carried out on the lower hearths, the heating gases traveling upward against the flow of sludge. This countercurrent travel assures the most effective preheating and drying of the sludge, with a minimum consumption of fuel. Overburning of the material is avoided by the relatively low operating temperature of the kiln and the effective retention of heat in the furnace by the heavy radial, insulating brick lining of the furnace shell.

From this highly efficient lime kiln, with its rotating central shaft, sweeping rabble arms and closely controlled, low pressure blower, air supply, the reburned lime is carried by a drag conveyor 50 feet in length to the centrifugal-discharge Link-Belt bucket elevator serving the lime storage bin. From this latter receptacle, the lime reenters the causticizing system via the slaker unit.

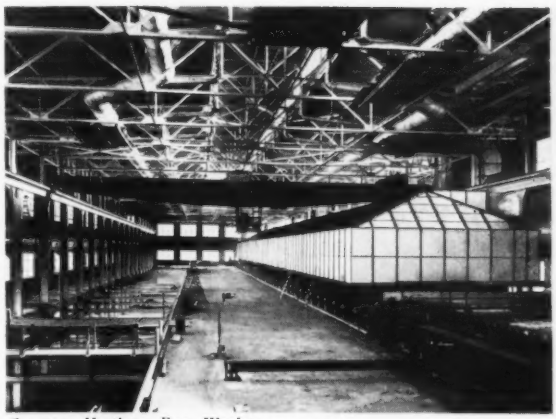
Pulp Preparation and Jordans

Wiener brown stock refiners, a 60-inch by 48-inch Shartle Brothers breaker beater and large Miami jordans prepare the pulp stock for the 213-inch Beloit high-speed kraft machine at the St. Joe Paper Company. The breaker beater is of somewhat new design, with an all-welded steel roll having carbon steel blades—the roll being equipped with marine bearings to prevent side thrust. The beater is operated by a V-belt flat drive.



Courtesy Shartle Bros. Mach. Co.

60 INCH BY 48 INCH SHARTLE BROTHERS BREAKER BEATER.



Courtesy Northern Eng. Works

MACHINE ROOM, SHOWING 213 INCH BELOIT FOURDRINIER WITH ROSS HOOD AND GREAT 30 TON CRANE.

The back fall is of double rolled-steel plate construction, permitting the replacement of the top plate when worn, and the heavy steel side plates are so accurate that the breaker roll runs with less than ⅛-inch clearance of the sides. The gland type packing boxes are of the sliding plate spring loading type, eliminating leakage, and the all steel-welded bead of heavy plate construction is formed to the special contour best suited for good pulp circulation. The substantial steel tub of the breaker has a concrete bottom and is furnished with large dump valves to facilitate tub cleaning and a regulating box is provided for controlling the level of the stock in the beater.

The jordans are fitted with a special filling designed for the stock run at St. Joe. Equipped with Messenger bearings of the radial and thrust type, with piston ring seals in the bearings, these jordans are directly connected to their driving motors through Shartle flexible couplings.

High-Speed Kraft Machine

The fourdrinier section of the Beloit machine is provided with a double adjustable high slice having a flexible lip and micrometer adjustment. The head box is of special design, to accommodate this high head and secure an even distribution of stock, yet the fourdrinier is of convenient operating height, so arranged that the operator can easily see what is taking place from the machine room floor. The wire is 213 inches in width and extra long, enabling the fourdinier to give good formation at exceptionally high speeds, as the wire part is provided with a heavy duty supershake which imparts a sharp jolting action to the wire.

The table rolls are of aluminum covered with micarta, holding down the weight of the shaken equipment, and the wire rolls are covered with hard rubber. Both the wire and table rolls are carried in Timken anti-friction bearings.

The stainless steel suction boxes are mounted on bars supported on micarta spring boards and are actuated by fully enclosed oscillators built into the fourdrinier side frame. The eccentrics are mounted on roller bearings and operate in oil and, since the micarta boards eliminate all sliding parts, they permit

the bars supporting the suction boxes to move in either direction.

Provisions are made for quick wire changing, sharply cutting down enforced interruption to machine operation. A wire loop is strung in the machine room aisle before the machine is shut down or the connections to the suction boxes broken. The new wire bundle, mounted in a special carriage in which the wire poles are suitably carried, is unreeled from the breast roll end toward the couch end, a loop is formed and the wire poles, supported from overhead cables, put in place. The complete fourdrinier, from the breast roll to and including the guide roll, is then run out bodily into the wire loop in the aisle. On returning the fourdrinier to its operating position, with the new wire, an extended loop of the wire, formed by poles inserted at the couch end, carries the wire over the cantilever suction couch roll, which remains in place in the frame connected to its drive. The wire poles holding the extended loop are then removed, the wire tightened and the machine is ready to resume paper making.

The press section is carried on extremely low centers, enabling the operator to look directly down into the nip and take note of what is taking place—a great convenience from an operating standpoint. The heavy duty first and second press rolls, which are the outside rolls of the dual press section, are rubber covered suction rolls, while the center roll is a large bronze unit equipped with an oscillating doctor and motor driven broke conveyor. All three rolls of the dual press are mounted in extra heavy SKF roller bearings and pressure is applied to the outside rolls by means of calibrated springs operated by hand.

Drier Section

The drier section of the machine consists of seventy-two main driers of 60-inch diameter and 208-inch face, besides twenty felt driers, 48 inches in diameter, arranged in four sections, and two calender driers 60 inches in diameter. While there are no felts on the last section of driers, an automatic carrier is provided to carry the sheet through the entire drier section. The driers, themselves, are mounted in SKF roller bearings, front and rear, with front housings designed to compensate for the expansion which takes place in the driers.

The Midwest-Fulton drier drainage system is employed and, as is customary with these systems, the wet end section of the driers is arranged to secure a graduated, increasing surface drying temperature, thus avoiding excessive paper shrinkage, case-hardening and cockling. The wet end driers are fitted with Midwest Visi-Flow units, so that the flow of condensate from each of these driers may be observed at any time, and there are no traps or other devices requiring maintenance in the system.

All driers are equipped with Beloit high-speed water-extractor devices, consisting of specially designed scoops, in place of syphons, which, under the suction of a Jennings drier drainage pump, evacuate the water and prevent the formation of puddles in the driers at all speeds. These driers are driven by enclosed silent-chain transmissions, the chains and sprockets of which are housed in the back drier frame, with the back drier bearings outside the chain sprockets and easily accessible.

Hood and Ventilating Systems

A mighty Ross hood, constructed of panels of Transite board, covers the entire drier section and is provided with efficient exhaust and felt supply sytems, supplemented by effective machine room ventilation. In these respects, the installation at St. Joe is quite similar to that at the mill of he Chesapeake-Camp Corporation described elsewhere in these columns, with the addition, however, of a Ross-Grewin system for increasing the drying capacity of the machine.

This system furnishes a supplementary supply of drying air by means of a centrifugal blower, the air being heated by copper radiation coils. Installed by the J. O. Ross Engineering Corporation, the system is commanding a good deal of attention.

Calender Stacks and Reels

The calender stacks, eight rolls high, depart from the conventional arrangement. The rolls are all mounted in roller bearings and the stack columns form a heavy bridge truss in the machine, a construction which adds greatly to the rigidity of the stack. With this arrangement, when it is necessary to remove an intermediate roll, or even the bottom roll, a motor operated lift quickly separates the rolls, the bearings are easily disconnected from the frame, and a hitch from the overhead crane moves the roll out in front of the stack and on to the grinder. The calender doctors are mounted on the bearing housings, so that they are always in the same relation to the rolls, regardless of any roll movement.

The reel also incorporates a number of important refinements, as does the heavy duty winder which relieves the operators of all heavy lifting. When the finished roll of paper is wound, it is only necessary to push a button and the roll is automatically pushed from the drums onto a chain conveyor operating across the front of the winder, from the front to the back side. The front end of the winder shaft is clamped in an adjustable stand and as the conveyor is started the rolls of paper are removed from the shaft. As this is being done, arms automatically fall into position, support the winder shaft and, while the next roll of paper is being wound, return it to the spare shaft position in front of the winder drums. The operator has only to slide the shaft from the spare shaft position down into its operating position.

Sectional Drives

The various sections of the machine are driven by a G.E. sectionalized paper-machine drive over a speed range of from 200 feet per minute to 1,200 feet, the actuating power being furnished by a motor-generator set to furnish power for the paper machine, direct current generator for the winder, and the necessary auxiliary exciting equipment. The sectionalized paper machine drive includes motors for all sections of the machine, with herringbone-type reduction gear units mounted on structural steel bases, the connections between the motors and gears being through flexible high-speed couplings. Where necessary, flywheels are installed to equalize response to acceleration and deceleration on sections of light inertia.

A G.E. compensated Selsyn speed regulator controls the motors on this sectionalized drive and these motors are supplied with clean, dry air by a motor driven blower. The Selsyns for draw adjustment, totally enclosed, and regulator cone pulleys mounted next to the motors are provided with protective covers.

Winder Drive

The winder is equipped with a G.E. regenerative braking, constant tension drive, each of the two

winder drums being driven by an enclosed, direct current motor connected through a herringbone reduction gear unit. The braking generator attached to the unwinding stand has a speed range such that operation from a full row to an empty mandrel can be provided for with constant tension at all times. Automatic control of tension between the unwinding stand and the winder is provided for and assures tension cntrol over the operating speed of the winder, up to a maximum speed of 3000 feet per minute. Provision is also made for adjusting tension and speed conveniently by control equipment mounted on the front of the winder.

Vacuum Pumps

The vacuum pumps with which the machine is equipped, are Nash units.

Other Nash units in the plant include four vacuum pumps for the Oliver brown stock washers; an all iron vacuum pump serving the lime mud filter in the causticizing system, and the Jennings drier drainage pump used in the Midwest-Fulton system.

Cranes

The great 30-ton crane in the machine room also commands attention, as do the other nine Northern Engineering cranes located elsewhere throughout the plant—two in the roll grinder room, two in the turbine room, 6-ton, 8-ton and 10-ton short span cranes for the drive aisles, reels and the well appointed machine shop, and the warehouse crane of 7½ ton capacity and the greatest span. Also, the 10-ton crane in the stock preparing room.

The machine room crane of 79-foot span is a five motor, double trolley, cab controlled unit used to handle the rolls in and out of the machine now in place and will serve a second machine when installed in a similar capacity. The two 15-ton roll grinder cranes, one at each end, lift the rolls into the grinder and, after the rolls are ground, redeposits them on the truck for return to the machine room, where the big crane lifts them back into the centres of the paper machine.

The 10-ton crane in the stock preparing room spans 62 feet and is used to set the machinery, for handling repairs and for maintenance service. The stock is fed into the paper machine at the stock preparing room end and the finished paper comes off the machine at the far end, at which point is located the 10-ton reel crane, which takes the finished reels of paper from the machine to the winders.

The 7½ ton, three motor, cab-controlled crane in the 95 by 360 foot warehouse has a span of 93 feet, almost the full width of the building, and is arranged for high speeds—a hoisting speed of 50 feet per minute, bridge travel of 400 feet per minute and trolley travel of 200 feet per minute. A special motor operated grab suspended from the crane cab by two sets of cables and operated by the operator in the cab drops down on a roll of paper, automatically centres itself and takes hold on the ends of the roll, enabling the crane to raise and convey it to any part of the warehouse and lower the roll onto a truck or pile without manual labor.

Courtesy Layne & Bowler, Inc.

PUMPING PLANTS TAPPING DIFFERENT STRATA.

Other Noteworthy Features

Almost every other department of the great plant, the skeleton frame of which took close to 3,600 tons of steel, presents noteworthy features, inside and out, which makes St. Joe an outstanding development and one provided with unsurpassed facilities.

The officers of the St. Joe Paper Company—C. R. Van de Carr Jr., president; Al H. Mahrt, vice-president; W. T. Edwards, vice-president; Murray Smith, secretary; Roger L. Main, treasurer, and R. E. Hartman, general manager—can well be proud of the property they are to operate.

Sub-Contractors and Manufacturers of the Principal Equipment

Power boilers	The Babcock & Wilcox Co.
Bark burning furnaces	The M. A. Hofft Co.
Combustion control	Bailey Meter Co.
Condensers	C. H. Wheeler Mfg. Co.
Deaerating heater	Cochrane Corporation
Oil pump	Worthington Pump & Mfg. Corp.
Storage tank oil heaters	Griscom-Russell Co.
Water conditioning	Hagan Corp.
Turbo-generators, switchgear, motors, electrical equipment	General Electric Co.
Barking drum	Chicago Bridge & Iron Co.
Chipper	Carthage Machine Co.
Crusher	D. J. Murray Mfg. Co.
Conveyors, chip, bark	The Jeffrey Mfg. Co.
Belting, conveyor	Gulf Hardware & Supply Co.
Digesters	Chicago Bridge & Iron Co.
Digester circulating system	Fibre Making Processes, Inc.
Rosenblad Blowsteam condenser plant	Fibre Making Processes, Inc.
Lime handling equipment	Link-Belt Co.
Cyclone	Hammond Iron Works
Evaporator	Swenson Evaporator Co.
Recovery units	The Babcock & Wilcox Co.
Metering and control equipment	Bailey Meter Co.
Lime crusher	American Pulverizer Co.
Recausticizing system	The Dorr Company, Inc.
Washers, filters, saveall	Oliver-United Filters, Inc.
Pumps	Gould Pumps, Inc.
Lime furnace	Nichols Eng. & Research Corp.
Agitators	Pulp Bleaching Co.
Refiners	Wiener Bros. Eng. Co.
Jordans, breaker beater	Shartle Bros.
Fourdrinier	Beloit Iron Works
Vacuum pumps	Nash Eng. Co.
Drier drainage system	Midwest-Fulton Machine Co.
Hood, ventilating system	J. O. Ross Eng. Corp.
Machine bearings	S. K. F. Industries, Inc.
Drier felts	W. E. Hooper & Sons Co.
Press rolls	Stowe-Woodward, Inc.
Instruments	The Foxboro Co.
Roll conveyor	Logan Co.
Cranes	Northern Eng. Works
Scale	Toledo Scale Co.
Tanks Miscellaneous	Hammond Iron Works R. D. Cole Mfg. Co.
Air compressor	Chicago Pneumatic Tool Co.
Meters	Republic Flow Meters Co.
Cable, conduit	Westinghouse Supply Co.
Sprinkler system	Grinnell Co.
Pipes and valves	Crane Co.
Texrope drives	Allis-Chalmers Mfg. Co.
Insulation	Guy M. Beaty
Water supply	Dixie Culvert & Metal Co.
Pipe laying	Salmon Dredging Co.
Well turbine pumps	Lane-Central Co.
Stack	Alphons Custodis Chimney Construction Co.
Structural steel	Virginia Bridge Co.
Sheet metal	Carnegie-Illinois Steel Corp.
Roofing	Brooks Roofing Co. Federal American Cement Tile Co.
Window sash, steel	Detroit Steel Products Co.
Elevator	General Elevator Co.
Foundation piles	Raymond Concrete Pile Co.

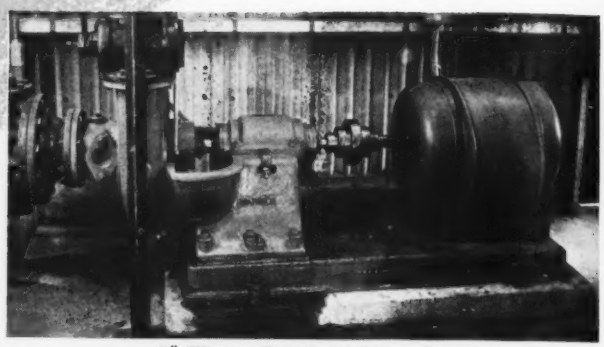
FRESH WATER
WHITE WATER
LIQUORS—STOCK

WARREN PUMPS THEM ALL AT BRUNSWICK MILLS

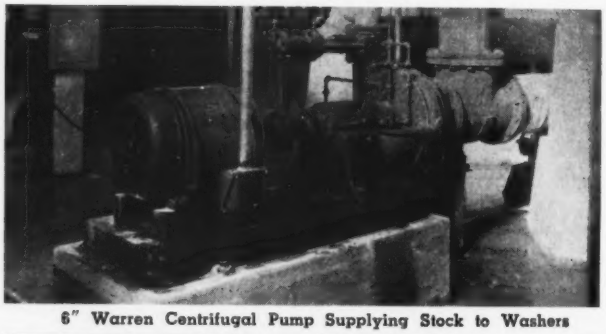
Warren Pumps were chosen because the Brunswick Engineers had confidence in their ability to meet every demand that might be made upon them. These men know that Warren considers each installation an individual engineering problem—that Warren Pumps are built to meet specific requirements accurately.

The ability of Warren stock pumps, for example, to handle high density stock steadily and efficiently is based on the close attention Warren engineers give to details. Special vanes on the impellers prevent clogging and binding—liberal clearances reduce wear, save maintenance—extra large inlets insure heavy stock reaching the impeller.

Your Warren representative will be glad to study your pumping requirements and prepare recommendations in the interest of improving efficiency and lowering costs in your mill.



6" Warren Centrifugal Liquor Pump



6" Warren Centrifugal Pump Supplying Stock to Washers

10" Warren Liquor Pump

WARREN

WARREN STEAM PUMP CO. INC., WARREN, MASS.

Brunswick Pulp and Paper Company

Brunswick, Georgia

The new pulp mill of the Brunswick Pulp and Paper Company, located on a large track of filled-in marshland on the Turtle River, midway between Brunswick, Ga., and the ocean, is a co-operative venture based upon common interests and mutual understanding—a venture clearly destined to draw the North and the South closer together commercially and industrially. The common stock of the pulp concern is held equally by two farsighted and highly successful paper mills, the Mead Corporation of Chillicothe, Ohio and the Scott Paper Company of Chester, Pa., which well established leaders in the paper making field will take the entire output of the new pulp mill on terms which are highly advantageous to the southern interests—on a cost plus basis.

Launched under these favorable auspices, further similar developments are to be anticipated in the near future. In fact, since the share of the Brunswick pulp shipped to Chester barely covers 30 per cent of the Scott Paper Company's present requirements, plans have already been made, by the same northern interests, for the erection of a second pulp mill unit on the Southern Atlantic seaboard. This domestic pooling of resources gives much promise and focuses the attention for the moment upon the Brunswick mill, the construction of which involved an investment of some $3,000,000.

This outstanding mill, engineered by O. C. Schoenwerk and built by the Stone & Webster Corporation, is not only admirably equipped throughout for a production of 150 tons of bleached sulphate pulp per day, but is exceptionally well situated on a plateau of gleaming white sand on the edge of a channel deep enough to float large ocean going freighters. Spurs from two rail trunklines also serve the mill and an excellent hard surface road has been built to connect with the main highways leading out of Brunswick. Thus, exceptionally good shipping facilities are provided for mill product by rail and water and the supplies of pulp logs from the pine lands of southern Georgia and other raw materials come in expeditiously and economically.

The Plant

As for the pulp producing plant, designed by O. C. Schoenwerk, it is likewise a model of efficiency, making any pertinent description chiefly a listing, or tabulation, of approved and advanced pulp making and power plant equipment. There are, however, certain general plant features which well command more detailed comment, equipment and practices in mill and power plant which are indicative of the marked progress in pulp making since the establishment of Southern pine as among the world's most important paper making materials.

Among these are the great high-pressure steam plant, with its recovery and waste burning units, its well nigh automatic operation, and the systems for the reclamation of chemicals and the salvage from wastes of all kinds which formerly burdened production and added to the cost of pulp. It is this greater efficiency of the new Southern mills and the advances they have made in the utilization of raw materials and other supplies that are the outstanding characteristics of the present southern movement of the pulp and paper industry. These better and cheaper methods, especially in the production of pulps, are having marked influence on paper making, revitalizing older paper mills in other sections, by furnishing high quality pulps in increasing volume at attractive prices, and at the same time building up a great and profitable industry in the southland. Rarely have the resources of one section of the country been developed so advantageously for the interests of other sections.

The Power House

The power plant at Brunswick is capable of gen-

erating close to a quarter of a million pounds of steam at a working pressure of 440-450 pounds per square inch and superheated to a temperature in excess of 700 degrees Fahrenheit, when operating the two large power boilers and the recovery unit at the same time. All these steamers are designed for 475 pounds per square inch steam pressure, providing adequate safety and reserve capacity, and the power boilers for selective fuel. That is, the forced draft burners of the latter steam generators are designed for initial oil and future pulverized coal firing.

The recovery unit, a B&W-Tomlinson assemblage, supplied with concentrated kraft black liquor fuel from a great six-body, long-tube (all welded steel construction) vertical Swenson evaporator, includes a three-drum waste-fuel boiler of some 9,672 square feet of heating surface, capable of generating 65,300 pounds of high-pressure steam per hour, and a completely water-cooled furnace and connection flue between the furnace and boiler, the total exposed furnace and flue area being approximately 2,230 square feet. A loop-type superheater is employed, raising the total steam temperature to 710 degrees F. at maximum steaming capacity, a return-bend loop-tube economizer of 2,010 square feet heating surface and a welded element air heating presenting close to 6,980 square feet of effective heating surface. The assemblage also includes a spray tower, dissolving tank, mixing chamber, green- and black-liquor pumps, independent forced and induced draft fans and a highly developed metering and control system—with, of course, all necessary flues and ducts.

The two oil- and bark-burning units consist of B&W Integral Furnace boilers with three forced draft, circular-type, burners suitable for either oil or pulverized-coal firing, and M. A. Hofft bark-burning extension furnaces. These latter appurtenances consist of twin Dutch Ovens surmounted by capacious bark storage bins, charged by drag conveyors and from which the bark refuse is fed into the furnaces under sensitive feed regulation. These power boilers, the bark burning units, are also furnished with B&W loop-type superheaters, to secure a total steam temperature of 710 degrees when generating up to 80,000 pounds of high-pressure steam per hour with combination oil- and bark-fuel firing.

Combustion Control

An exceedingly efficacious system of metering and combustion control governs the operation of these three main steam generating units, the two power boilers and the recovery unit assemblage, and virtually runs the plant. The control for the two bark and oil burning boilers is especially interesting as the meters employed are so adjusted and compensated as to show a correct indication of combustion efficiency at all times, regardless of the respective proportions of bark and oil being burned under the boilers.

A Bailey fuel-flow air-flow ratio meter, provided with an air pilot valve, controls the fuel oil feed to each power boiler automatically, in accordance with the existing demand for steam, and governs and closely adjusts simultaneously the combustion air supply to the boiler furnaces, while the air supply to the bark burning extension furnaces is regulated manually, in accordance with conditions as found by a boiler meter equipped with an automatic compensator. The function of this compensator is to readjust, or calibrate, the boiler meter setting in such a way that its steam flow and air flow graphs coincide exactly—*i.e.*, are superimposed—when a condition of maximum combustion efficiency holds. Thus, irrespective of the relative proportions of oil and bark being consumed, the highest attainable boiler efficiency is secured when and as the air flow and steam flow pens of the boiler meter trace a common graph. To maintain this desirable situation, the boiler operator has simply to manipulate as required the valve regulating the admission of combustion air to the bark burning extension.

For the combustion control of the black liquor fired recovery unit, the balance of combustion air supply to black liquor flow requirements for best boiler efficiency is secured in quite a similar manner. An adjustment valve on the boiler panel has merely to be manipulated to hold the graphs traced by the black liquor and air flow pens of the Boiler Meter together—when this occurs, and only then, the recovery unit is operating most effectively, at maximum combustion economy.

Six or Seven Steam Supplies

As the 440-450 pound steam at a temperature in excess of 700 degrees Fahrenheit, supplied by the main steam generators, is suitable for only certain services—chiefly for use in the plant's 4,000 kilowatt (5,000 kva., 80 per cent power factor) double automatic extraction turbo-generator prime mover—a large portion of this boiler supply has to be reduced in pressure—this in addition to the steam supplies secured by extraction from the main G. E. steam turbine. At Brunswick, this is done by half a dozen accurately controlled pressure reducing and regulating Smoot turbine type valves.

A 6-inch lever operated, turbine type valve of 187,000 pounds of steam per hour capacity first reduces a portion of the steam at 450 pounds per square inch gauge pressure at 700 degrees to a 150 pound gauge supply at 680 degrees. A second lever operated valve then reduces a portion of this 150 pound steam to a 35 pound supply at a temperature of 650 degrees. A portion of this latter steam is further reduced to 5 pound pressure through a third lever operated reducing valve. Each of these three valves is under the control of a Smoot air operated, spring loaded regulator, which operates its particular reducing valve through a relay cylinder.

A fourth lever operated reducing valve is installed to pass some of the steam from a header of 450 pound saturated steam to another header supplying saturated steam at 200 pounds pressure. This reducing valve is also under the control of a Smoot air operated, spring loaded regulator.

To maintain constant pressure on a 630 pound per square inch boiler feedwater header, a fifth Smoot lever operated valve is installed in the steam supply line to a booster pump and is controlled by an air operated regulator, governing valve connected to the high-pressure feedwater header. With this arrangement, any variation in the header pressure modifies the speed of the turbine driven booster pump so as to compensate for the variation.

The sixth Smoot pressure regulating valve is in a steam line leading to a turbine driven booster pump on a 125 pound per square inch feedwater header. This valve is under the control of a Smoot regulator which has its pressure head connected to the feedwater header and so secures constant header pressure by simply adjusting the speed of the booster pump.

Condensation of Prime Mover Exhaust

The condensing equipment of the main 4,000 kilowatt extraction turbine may aptly be termed "tailor made." It is a C. H. Wheeler condenser designed for a normal operating condition of 25,000 pounds of exhaust steam per hour, the amount of turbine exhaust at 2 pound absolute pressure *after* the essential extractions for process steam at 150 pound and 35 pound gauge have been made. This "fitted" condenser is approximately 54 inches in internal diameter, of two-pass design, and has 3,130 square feet of condensing surface, arranged in a semi dual bank, radially spaced. It takes less than 4,000 gallons of water at an inlet temperature of 80 degrees to effect the condensation of the 25,000 pounds of steam.

The condensate is removed from the main condenser by a C. H. Wheeler condensate pump, motor driven at about 750 revolutions per minute. It has a capacity of 65 gallons of condensate against an external discharge head of approximately 50 feet. For the disposal of the air and non-condensible vapors and the maintenance of the required vacuum, a C. H. Wheeler Tubejet, consisting of two two-stage elements mounted on a surface type inter and after condenser, each element capable of maintaining the required absolute pressure under the specified conditions.

The inter and after condenser is equipped with a cold pass, through which, should there be a deficiency in condensate at any time, due to the extracted steam balancing against the power output, raw water can be passed for condensing the operating steam of the ejector, without any intermingling of the raw water and condensate. Other details of interest are that the expansion movement between the turbine exhaust and the exhaust neck of the condenser is accommodated by a corrugated copper expansion joint and that circulation for the main condenser is maintained by a remotely located circulating pump.

Digester Refinements

The all important digesters at Brunswick, four of them, and the assemblage of related equipment are also decidedly noteworthy. The digesters themselves, Blaw-Knox units, are 11 feet 2 inches in diameter and 47 feet 6 inches in height—immense 3,800 cubic foot units of the stationary type. They conform in all respects to the *A.S.M.E. Code*, Class I, and have been subjected to exacting 150 pound per square inch water pressure tests.

Courtesy Chicago Bridge & Iron Co.

GROUP OF LIQUOR TANKS.

From the circular strainer in the middle of each digester, the cooking liquor is pumped by a F. M. P. circulating system to the top of a single-pass heater, from which it is repumped to the top and bottom of the digester, thus maintaining an efficient circulating and effective indirect heating system. The blowsteam from the blow tank passes through a jet condenser from which the contaminated condensate goes on to an accumulator. The hot water is pumped from the top of this accumulator through two Rosenblad spiral heat exchangers, by which a fresh water supply is heated for washing service. The foul, cooled-down condensate goes back to the bottom of the accumulator, from whence it is repumped to the jet condenser for use in condensing the blowsteam. The flow of this cold condensate is regulated automatically so as to keep the temperature of the hot condensate effluent from the jet condenser at a constant temperature.

During the relief of the digesters, the gases which are liberated—rich in turpentine—are caught in a trap from which the entrained liquor drains and the vapors pass on to a Rosenblad Turpentine Spiral Condenser and are cooled down by cold water. The condensate from this condenser then flows to a separator where the turpentine is decanted. Incidentally, hot water for washing purposes is also obtained in the spiral condenser, while the hot cooked pulp is blown by steam into the blow pit, the blow lines from any one of the four digesters discharging through a 4-way Sandberg Central Valve, where the released vapors are caught and discharged into the condensing system. Each of the digesters is also furnished with a Dramen Blow Valve, a combination disc and gate valve.

Bronze Vat Screens

The twenty-four 14-plate "Impco" flat vat screens, arranged at Brunswick in orderly lines of four screens each and actuated by direct coupled gear-motors, are of bronze and costing somewhat more, consequently, than conventional wood vat screens, command attention. Their chief advantages lie in their greater cleanliness and rigidity, as compared to wood, of the metal construction. Also, the screens have shown unusually high capacity on all grades of stock, attributable in part, doubtless, to the "draft tube" design of the outlet passage for the accepted stock from each diaphragm compartment. This construction provides a wide exit for the unrestricted flow of stock, the effect of which is to create a suction on the plates and thereby increase noticeably screen capacity.

The screen "Dunbar Drive," the positive nature of which also tends to promote plate cleanliness, consists of a main drive shaft extending under the four screens in each line, with a single eccentric under each screen. This eccentric imparts motion, through a connecting rod, to the screen's rocker shaft, on which are mounted arms which transmit the stroke, which is readily adjustable, through Pitmans to the diaphragms.

The screen vats are of cast bronze and, consequently, quite rigid. Furthermore, the "one piece" vat is much more resistant to corrosion than are vats of fabricated metal construction.

Pumping Equipment

Pumps constituting highly essential equipment in any pulp mill, the selection of pumps at Brunswick—especially those which may be designated as mill

pumps, to distinguish them from the numerous special pumps incorporated in machinery units and assemblages—is highly pertinent. In fact, the choice of pumps made for this mill may be looked upon almost as a guide to approved modern pulp mill pumping equipment requirements. As such, it is interesting to note that the mill pumps installed are without exception of the centrifugal type.

The three main fresh water supply Warren pumps, 8-, 10-, and 14-inch units, are all of the double suction, single stage, hydraulically balanced type, with enclosed impellers and horizontally split casings, mounted on unit bedplates. The two 12-inch Warren white water pumps are quite similar, except that special vent openings are provided in the casings for the prevention of surging.

One large 12-inch Warren stock pump is also of the double suction, single stage, variety, but all ten of the smaller Warren stock pumps are of the single suction type. Each of these pumps is, however, of the open, non-clogging, impeller type, with its suction nozzle provided with a removable cover hand hole, as well as a washout opening.

The eighteen liquor pumps—chiefly 2-, 3- and 4-inch pumps, though there are two large 10-inch units and also Warrens—are of the single suction, open, non-clogging, impeller variety, with renewable suction and head liners, covered hand holes and washout openings. On the pumps handling corrosive liquids (milk of lime, bleach liquor, caustic, etc.), the suction nozzles are provided with large cover plates, so that the impeller and pump suction passages can be cleaned without disturbing any pipe connections.

Two large 14-inch Warren booster pumps, employed to increase the flow of high-density stock through discharge lines, are of a special vertical design. They are of unit construction, with the driving motor—connected to the pump through a rigid coupling—mounted above the pump on a rigid supporting base. The impellers of these pumps are of the open type and the submerged pump bearings are arranged for fresh water lubrication.

The fan pump, excess white water and broke beater pumps, also, are somewhat special, their service requirements necessitating a rather unusual shallow pit type of pump. Furthermore, those Warren pumps are provided with top suction and vertical discharge outlets which terminate above the pump bowl through pipes extending through the motor supporting bases. The casings of these units are fitted with renewable suction liners and provisions are made to guard against pump surging.

Courtesy Chicago Bridge & Iron Co.

VIEW OF 150,000 GALLON ELEVATED TANK LEFT CENTER—3 CONE BOTTOM AND TOP SALT CAKE STORAGE TANKS RIGHT CENTER—10,000 BARREL FUEL OIL TANK AT EXTREME RIGHT.

Courtesy Chicago Bridge & Iron Co.

50,000 GALLON WASH WATER TANK IN FOREGROUND WITH BLOW PIT DIRECTLY BEHIND.

Tanks and Bins

Great tanks, whether viewed as accessories to the pumping equipment or as individual units, are grouped about the mill buildings and cannot well be overlooked, indicative as they are of the provisions which have been made for the smooth and uninterrupted operation of the plant. First, there is the large 150,000 gallon water tank for fire protection and general service which dominates the landscape. It is 120 feet to the bottom of this tank. Then, there are three 50,000 gallon elevated wash-water tanks, 50, 40 and 25 feet in the air respectively.

Somewhat further removed is a 10,000 barrel fuel oil storage tank. This prominence is surrounded by a steel dike, or fire wall, 87 feet 6 inches in diameter and almost 14 feet high.

Other tanks include a 16 foot hot-water storage tank, some 20 feet high; a 20 foot high-vapor tank, 25 feet high; two 15,000 gallon turpentine tanks; a condensate tank operating at 50 pounds per square inch pressure; a 25 foot fresh-water tank, 15 feet high; and three 12 foot 6 inch pulp bleach storage tanks, 32 feet long. For handling liquor storage, there are two 40 foot tanks, 20 feet high; two 30 foot tanks, 29 feet high; two 10 foot tanks, 12 feet high; and three 12 foot measuring tanks, 22 feet high. The elevated blow tank is 14 feet in diameter and there is a 15 foot, 15 feet high, caustic storage tank.

All these tanks, built by the Chicago Bridge and Iron Company, are circular of butt welded construction, with plate shell thickness running from ¼ to 5/16 inch, as are also a 300 ton dry lime bin with a conical bottom and three 833 ton, conical bottom, salt cake storage bins. In addition, the outdoor tankage includes four Kalamazoo tile tanks arranged in twin batteries of two, with the adjoining tanks

tangent to one another. Each of these tanks measures 24 feet in internal diameter and is 20 feet high, with a double 14-inch wall extending up approximately 15 feet. Where the double wall stops, there is an 8-inch ledge on which rests a triangular shaped concrete slab with a 4 foot tile wall, forming an overflow well suspended about 16 feet above the ground.

Electrical Equipment

Briefly touching upon the mill's electrical equipment and starting with the generation of the power supply at the power plant, interest is first held by the 4,000 kilowatt—5,000 kilovolt-ampere (0.8 power factor) automatic extraction General Electric turbo-generator set. This prime mover is driven by steam at some 425 pounds per square inch gauge pressure and close to 750 degrees, Fahrenheit, in total temperature. Excitation for this generator is furnished by a direct connected, shunt wound G.E. exciter and the voltage of the large generator is held constant by a rheostat type of voltage regulator, which forms an integral part of the switchgear equipment.

This switchgear equipment consists of circuit breakers and other high voltage apparatus, mounted in a switch room underneath the generator. The operating control is provided, however, from a well appointed, steel panel, switchboard set on the turbine room floor.

Power is distributed throughout the mill at 2,200 and 440 volts, 3 phase. The higher voltage mains serve the larger G.E. motors—those from 50 horsepower up—and the lower voltage lines the numerous smaller squirrel cage motors used generally throughout the mill—for pumps, agitators, conveyors, etc. The two chipper drive motors, 250-horsepower direct connected units, are synchronous G.E. motors, driven from the high voltage mains, as are also the vacuum pump motors.

The high voltage starters are of the enclosed variety, mostly of full voltage starting characteristic, well suited for their assemblage into the control board erected with disconnecting switch compartment above each starter. With this arrangement, the starters may be interconnected by means of the distribution bus. The 440 volt controls, for ease of installation and maintenance, are combination, fusible type, full voltage, magnetic starters.

The conveyor motors are of the G.E. gearmotor variety, with self-contained gear units on the motor shafts, so that the output shafts of the power units operate at speeds suitable for conveyor drive service. Both the motors and the gears in these assemblages are of the splashproof type, affording proper protection against dripping and splashing water.

The sectional drive of the Fourdrinier, pulp drying machine, providing an operating speed range of from 100 to 300 feet per minute, secures its regulation by adjustable generator voltage control of the energy applied to the direct current sectional G.E. driving motors. This type of drive is well suited to the Brunswick mill requirements and was undoubtedly instrumental in holding down building costs, by reason of the marked compactness or arrangement of machine and auxiliaries.

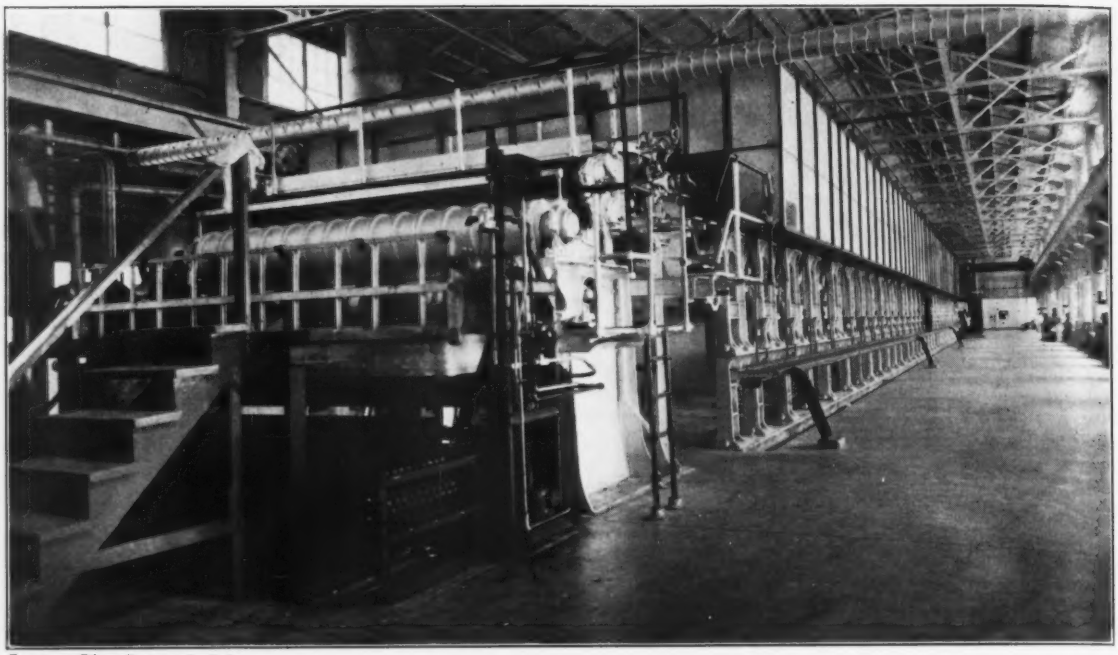
Machine Features

The machine, built by Rice, Barton & Fales, is a non-shaking fourdrinier with an adjustable pitch to its 156-inch, 90-foot long, wire. It has a 30-inch suction couch, with a Jennings double suction centrifugal pump of 300 gallon per minute capacity, from 20-inch vacuum, against a total head of 40 feet; three 30-inch diameter presses, suction, second and third; and a suction felt roll on the second and third felts.

The top first press roll and two bottom press rolls were supplied by Stowe-Woodward, Inc., as well as the pressure roll for the suction couch. There are two Nash vacuums for the felt cleaning rolls, requiring only about 49 brake-horsepower at 570 revolutions

Courtesy Rice, Barton & Fales

VIEW OF FOURDRINIER FROM WET END.



Courtesy Rice, Barton & Fales

VIEW OF FOURDRINIER FROM DRY END.

per minute, when handling 470 cubic feet of air per minute at 12-inch vacuum.

There is a receiving drier, sixty 60-inch diameter paper driers and a cutter and duplex slitter attached to the end of the machine. A Sheehan carrier is used, there being no felts, and a Midwest-Fulton drier drainage system is used, served by a Jennings drier drainage pump of 250 gallon per minute capacity against a 30 pound head, or 28 gallons per minute and 11 cubic feet of air from 10-inch vacuum against 30 pounds.

A Ross Vapor Absorption System has been installed to carry away the moisture evaporated from the drier of this great pulp producing machine, which not only supplies heated air to absorb the water withdrawn from the pump, but applies this air most effectively, by blowing it directly on the sheet as it passes over the drying cylinder and distributing it across the full width of the pulp machine.

For catching the vapors from the machine, a great removable panel hood envelops the drying section, constructed so that portions of the hood can be removed without disturbing other parts of the large tent-like structure. The moisture laden air is removed from this hood through six outlets, each provided with a high efficiency, propeller type, exhaust fan.

The constant temperature and humidity room adjoining the machine room is equipped with an air conditioning unit for maintaining uniform testing conditions throughout the year, supplying heated or chilled air as required. This conditioner is of the spray type and is under the sensitive regulation of automatic pneumatic control.

Marked Efficiencies and Economies

The same high efficiency and marked economy in plant operation are general and many of the other units employed in this new pulp mill and the practices followed are distinctly noteworthy—well deserving of comment. The caustic plant, for instance, where the reclamation of lime mud and green liquor is effected at remarkably low costs; the highly efficient oiling and lubrication methods; the extent to which modern instrumentation has been carried throughout the plant; pipe covering practice and the insulation of boilers, buildings, roofs, etc.; and numerous other outstanding features.

The continuous re-causticizing system at the Brunswick mill, installed by The Dorr Company, Inc., is quite similar to that employed at the neighboring Union Bag and Paper Corporation plant at Savannah, Ga., where exhaustive tests were recently made to ascertain the overall efficiency of the method in soda recovery under normal operation. Based upon 2,250 pounds of total soda, as sodium sulphate per ton of pulp, in the clarified green liquor to the system, these tests showed the indicated total soda loss as only 26.36 pounds of Na_2SO_4 per ton of pulp. In other words, an overall soda recovery of 98.84 per cent.

SUMMARY OF TESTS[1]

Total soda entering	2,281.93 lbs.
Total soda recovered	2,255.566 lbs.
Total soda lost	26.364 lbs.
Overall soda recovery in:	
Green liquor system	99.88%
White liquor system	98.95%
Recausticizing system	98.84%

[1] For complete test results see PAPER TRADE JOURNAL, Oct. 28, 1937.
The Dorr Company, Inc.

Other mill equipment units, likewise, are without exception excellent of their kind and giving good results at Brunswick—barking drums and chippers, knotters, evaporators, right down to the great 600 ton press used for compressing the pulp for shipment and storage. Some brief comments on these and other pulp mill apparatus, consequently, are of almost as much general interest as the details of the power house serving the two establishments or of the eye-commanding digesters, screening and pumping equipment, tanks and bins, pulp fourdrinier, etc.

Wood Preparation

Starting then at the chip house, the flow of clean, firm, open-end-wood chips, notably free of sawdust and slivers, from the spout of the giant chipper is evidence of the importance placed upon the preparation of the wood for the digesters by the Brunswick Pulp & Paper Company. The barking of the pulp logs is consummated with a minimum of log bruising and brooming and the positive shearing action of the closely adjusted chipper knives serves to hold down sawdust formation.

The removal of bark and refuse is effected efficiently and solely by the tumbling action of the pulp logs upon one another in a huge, all steel, Murray-Branch barking drum of the trunnion type, the interior surface of which is free from all projections and roughness. The drum is constructed of heavy ship channels with outwardly facing flanges fitted and bolted to accurately machined shouldered spacing-lugs on the inner side of heavy steel tires. Ample showers wash the loosened bark through the slots of the drum as fast as it is freed from the logs. These design and constructional refinements serve to cut maintenance expenses sharply and conserve power, as well maintain the high quality of the logs fed to the Murray pulpwood chipper.

This chipper, mounted on a substantial base, is a heavy-duty machine equipped with spherical, self-aligning, roller bearings and precision thrust plates, thereby securing exceedingly close knife bed adjustment. The knives are set in removable cages and the length of chip can be varied without removing or disturbing the disc, besides which operating advantages the ruggedness of the chipper and the general elimination of bearing backlash minimize vibration and serve to stabilize and reduce power requirements, as well as maintain uniformity of high grade chip production.

Pulp Washing and Filtering

The washing of the pulp before its delivery to the screens is, at the Brunswick mill, a three-stage undertaking—primary washing, performed in an 8 x 8 foot filter unit; secondary washing, in an 8 x 10 foot unit; and a re-washing in a 6 x 8 foot filter. These three Oliver-Young screen units are quite similar in construction, the drums being of high quality cast iron treated with 3 per cent nickel and the tanks of steel with stainless steel covers and wire winding.

VIEW IN WOOD YARD WITH BARKING DRUM IN THE FOREGROUND AT LEFT.

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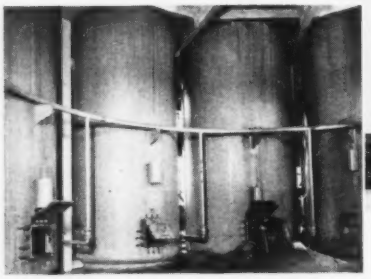
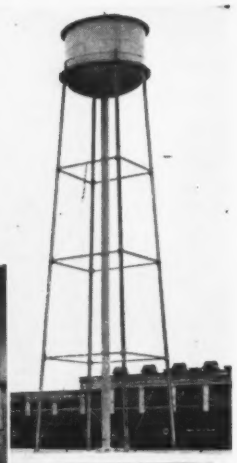
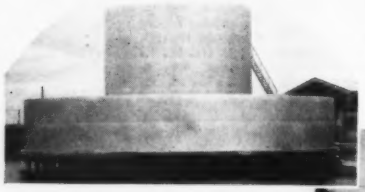
STEEL PLATE WORK





KRAFT: The picture above shows a 100,000-gal. elevated water tank built for the new Kraft mill at Fernandina, Fla. Other steel platework for this mill included the six diffusers shown in the top view at the left.



BRUNSWICK: Among the tanks built for the Brunswick Pulp & Paper Co. is the 10,000-bbl. fuel oil tank with steel firewall shown above.

ST. JOE: Coming out of the stress-relieving furnace at the right is one of four digesters for the St. Joe Paper Co., Port St. Joe, Fla.

The above pictures offer some examples of the wide variety of steel platework and tanks being fabricated in our shops for the paper industry. Our organization's vast experience in designing, fabricating and erecting all types of steel platework and tanks in every branch of industry is your guarantee of personal service, thorough workmanship and complete satisfaction on any work you may be contemplating. Our three fabricating plants are equipped to handle both field-erected and shop-assembled work, including welded pressure vessels built in accordance with paragraph U-69 of A.S.M.E. Code for Unfired Pressure Vessels. The Birmingham plant, in addition, specializes in work radiographed and stress-relieved in accordance with paragraph U-68. Address our nearest office for information or quotations.

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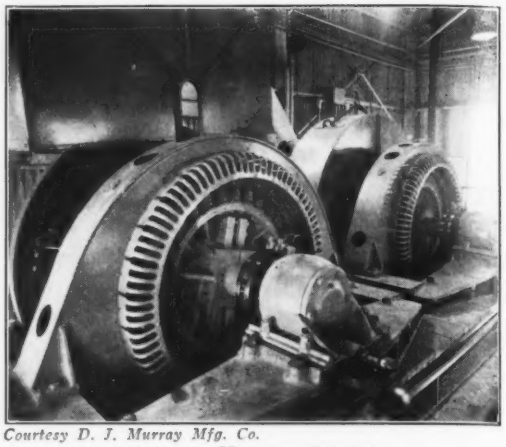


Courtesy D. J. Murray Mfg. Co.
CLOSE-UP VIEW OF CHIPPER.

As delivered by the third unit, the washed pulp sheet is thick, virtually free from any black liquor contamination or of soda content. The black liquor removed passes on to the evaporators at uniformly high density and high temperature, free from any trace of fiber.

Two 6 x 8 foot Oliver-Young decker filters handle the discharge from the screens, effecting sharp separation of pulp from water and consequent high fiber recovery. These units have redwood drums, steel tank, wire covers and wire winding.

A 6 x 3 foot Oliver continuous filter is also employed to handle the lime mud discharged from the lime mud clarifier of the recausticizing system, the lime mud after removal of the strong white liquor filtrate being washed and fed to the rotary lime kiln. This particular filter has a cast iron tank and drum, with stainless steel cover and wire winding. Incidentally, an all iron Nash vacuum pump is used for handling the alkaline solutions in connection with the filtering operations.

Pulp Compression

The 600-ton baling press, for increasing the pulp density for shipping purposes, is fed by gravity rollers with 400 to 500 pound pulp bales, which are about 30 inches in height as they come from the fourdrinier pulp machine, and compresses them to a uniform height of about 16 inches, forming pulp bales which run approximately 40 cubic feet of pulp sheets per ton. This Baldwin-Southwark unit is a self-contained, oil-operated press of the quick closing and pressing type.

The gravity filling of the main press cylinder causes a sharp drop of the pressing plate on top of the pulp bale, compressing it slightly, after which the two side cylinders of the press, fed by a rotary, piston-type pump, exert a quick downward thrust, attaining a pressure of 100 tons upon the bale in a few seconds. Then, the main press ram completes the baling operation, bringing the pulp bale down to the required height.

Instrumentation

The extent to which instrumentation and automatic control of processes is carried at the Brunswick Pulp & Paper Company plant, in the mill proper, is evident from the following brief notes upon the applications of Foxboro instruments and control units:

The four digesters are equipped with top relief controllers, steam flow meters and recording ther-

mometer and pressure gauges. The steam header is also provided with a Foxboro pressure controller. A liquid level controller governs the height of cook liquor in the measuring tank and a flow controller regulates the wash water supply to the diffusers.

In the recausticizing plant, a flow meter measures the green liquor and a temperature-controller regulates thermal conditions. A flow recorder also measures the steam at the lime kiln header.

The evaporator has an absolute pressure controller on the barometric condenser, a temperature-controller on the last stage, half a dozen evaporator pressure recorders, a temperature controller for the thick black liquor and a flow meter on the steam header.

The drier temperature in the machine room is under automatic control and a flow meter measures the steam drawn from the header supply. A steam flow meter also charts the take of the bleach liquor pump.

Results Uniformly Good

Mention might also well be made of the elevating and conveying Link-Belt machinery handling the salt cake into outside storage tanks, reclaiming conveyor to the mill, etc.; Trimbey knotters in the screen room; and the hundred and one efficient mechanisms throughout the plant which contribute much to the smooth operation of the new mill. The results secured with the installed equipment certainly speak well for the ability of the designing engineer, the skill of the builders and the executive sagacity displayed by the officials of the Brunswick Pulp & Paper Company. Much credit is also due the sub-contractors and equipment manufacturers who by their cooperation and well directed efforts built and equipped the mill.

The Officers

The officers of the Brunswick Pulp & Paper Company, Brunswick, Ga. are as follows:

George H. Mead, chairman; Charles R. Van de Carr, Jr., president; Edward S. Wagner, vice-president and treasurer; Sydney Ferguson, vice-president; J. L. Ober, vice-president and manager; William R. Scott, 3rd., secretary; William M. Garney, assistant secretary and treasurer.

O. S. Schoenwerk, designing engineer; Stone & Webster Engineering Corporation, general contractor.

Sub-Contractors and Manufacturers of the Principal Equipment

Barking drum and chipper	D. J. Murray Manufacturing Co.
Digester	Blaw-Knox Co.
Digester circulating and blow system	Fibre Making Processes, Inc.
Salt cake elevating equipment	Link-Belt Co.
Pulp washer	Oliver-United Filters, Inc.
Screen equipment	Improved Paper Machine Corp.
Blow pit, steel tanks	Chicago Bridge & Iron Co.
Knotters	Trimbey Machine Works
Bleaching plant	Pulp Bleaching Co.
Pumps	Warren Steam Pump Co.
Evaporators	Swenson Evaporator Co.
Fourdrinier pulp-drying machine	Rice, Barton & Fales, Inc.
Vacuum pumps	Nash Engineering Co.
Press rolls	Stowe-Woodward, Inc.
Drier drainage system	Midwest-Fulton Machine Co.
Ventilating equipment	J. O. Ross Engineering Corp.
Pulp press	Baldwin-Southwark Corp.
Recausticizing system	The Dorr Company, Inc.
Lime furnace	Nichols Engineering & Research Corp.
Boilers, power and recovery	The Babcock & Wilcox Co.
Bark burning furnace and feeders	The M. A. Hofft Co.
Condenser and auxiliaries	C. H. Wheeler Mfg. Co.
Combustion control	Bailey Meter Co.
Blowers and vacuum pumps	Root-Connersville Blower Corp.
Turbine and drive, electrical equip.	General Electric Co.
Lubricating system	S. F. Bowser & Co., Inc.
Insulation	Johns-Manville Corp.
Tile stock tanks	Kalamazoo Tank and Silo Corp.
Roofing and siding	R. J. Dorn & Company, Inc.
Window sash	Campbell Metal Window Corp.
Fire brick	A. P. Green Fire Brick Co.
Dredging	Parkhill Dredging Co.
Foundation piles	Raymond Concrete Pile Co.
Dock	W. H. Greenfield
Concrete	Waik & Co.
Structural steel	Virginia Bridge Co.
Water wells	Lane-Atlantic Co.
Redler Conveyors	Stephens-Adamson Mfg. Co.

Fire Greatest Danger To Southern Pine

By J. E. Lockwood, Naval Stores Consultant

Fire rather than increased consumption by paper mills is the chief danger to Southern forests that last year alone ravaged Georgia timberlands at an estimated cost of $10,000,000, said J. E. Lockwood, naval stores consultant in a recent issue of the *Morning News* of Savannah, Ga.

Mr. Lockwood points out that although Southern mills have realized the obvious necessity of reforestation where trees have been cut for pulp they have been less quick to see "... our greatest and most fundamental need," county-wide fire protection.

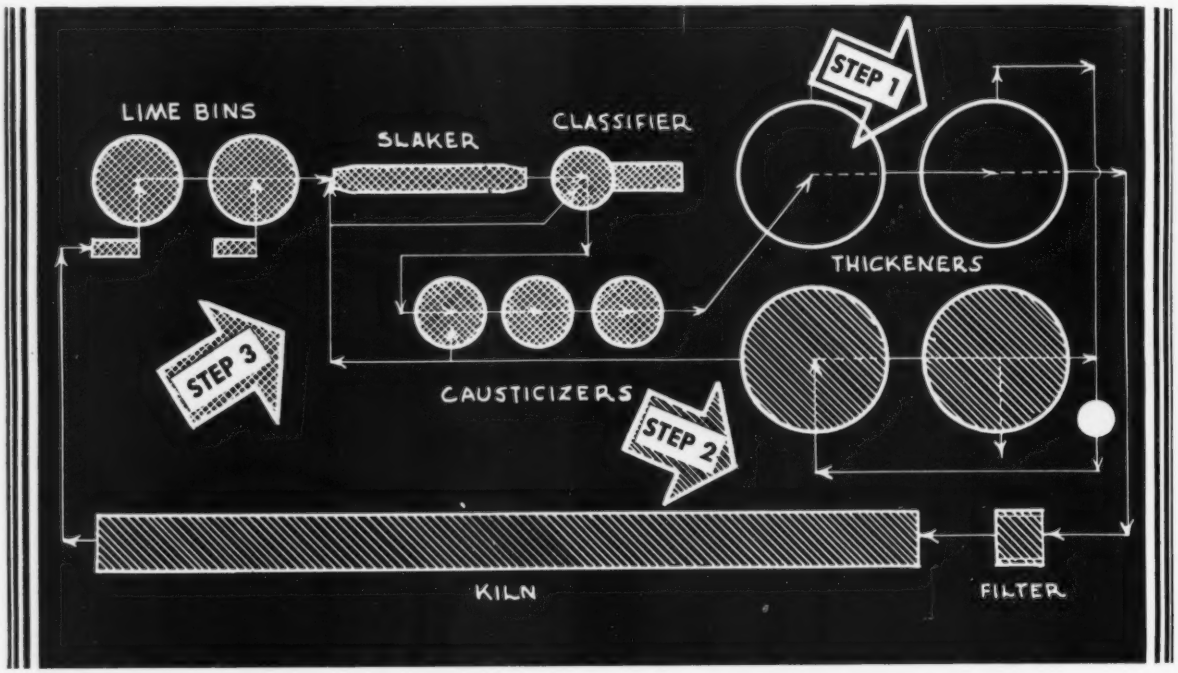
Mr. Lockwood says: "Several recently published articles on the Southern forest situation, quoting the views of leading government officials and economists, evidence their realization of the great advantages and undeveloped possibilities of Southern forests, and a desire to see this important natural resource conserved, developed and properly utilized, with permanent benefits to our country and the South. To that end, they call attention to certain dangers, and suggest that regulation is needed to protect the public interest in this valuable resource.

"But unfortunately they only stress the danger of an increasing consumption of timber products, causing a possible decreasing supply of timber resources, and call particular attention to the pulpwood requirements of southern pulp and paper mills, which they fear will eventually result in devastated timberlands. Their interest and concern is creditable. However, it is evident that they are not fully informed regarding the southern forest situation and recent developments in connection therewith, as the danger they mention is fast disappearing, while a much greater and more fundamental danger still exists, that deserves general consideration and prompt cooperation of all concerned to reduce and eliminate.

"Fortunately, the leaders in southern forestry investigations and development work, such as Dr. Charles H. Herty, the best informed and highest authority on southern forest possibilities, together with southern foresters and southern industrial leaders, are fully informed and actively cooperating in making clear to all concerned, the important fact, that our most pressing need is county and state-wide fire protection for southern forests. This is the fundamental need, to not only protect the present timber resources, but also to protect the young growth that

(Continued on page 48)

BATCH TO CONTINUOUS RECAUSTICIZING



ON A RETURN-OUT-OF-SAVING BASIS

THE new Southern sulfate mills* are *not* the only ones that can obtain the cost-cutting advantages of the Dorr Continuous Recausticizing System. Older mills with old fashioned batch recausticizing can switch to Dorr—step by step on a return-out-of-savings basis.

Here is a hypothetical case, based on three modernization programs now going forward, step by step.

STEP I — CONTINUOUS WHITE LIQUOR CLARIFICATION AND MUD WASHING
- Cost—24% of a complete Dorr System.
- Savings—46% of total savings possible.
- Time—312 days to repay cost out of savings.

STEP II — LIME REBURNING & AUXILIARIES
- Cost—64% of a complete Dorr System.
- Saving—54% of total saving possible.
- Time—715 days to repay cost out of savings.

STEP III — CONTINUOUS LIME SLAKING AND RECAUSTICIZING
- Cost—12% of a complete Dorr System.
- Saving—no direct savings, but all the operating advantages of a complete Dorr System.

Such a modernization program as this assures money being spent first where it will do the most good most quickly. Each step pays its own way and refinances itself before the next step is taken.

A Dorr engineer will gladly study your problems and prepare a "return on investment sheet" to point the way to plant modernization.

** 12 complete Dorr Systems—4060 tons per day capacity—10 new southern mills.*

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ARGENTINA: Luis Fiore, Buenos Aires • SOUTH AFRICA: Edward L. Bateman Pty. Ltd., Johannesburg • BRAZIL: Oscar Taves & Co., Rio de Janeiro

Chesapeake-Camp Corporation

Franklin, Virginia

The $3,500,000 pulp and paper mill of the Chesapeake-Camp Corporation, designed by J. E. Sirrine & Co., built by the Rust Engineering Company and recently placed in production at Franklin, Va., is an achievement which should rank high in the annals of present industrial developments in the South. Two of the leading interests in Virginia, both successful and firmly established, have built the plant jointly—the Camp Manufacturing Company, which operates a large saw mill adjacent to the site of the new kraft plant and has extensive lumber interest throughout the South, and the Chesapeake Corporation, which for the past twenty years has engaged in the manufacture of quality kraft products in nearby West Point.

Few enterprises of this magnitude have been launched under as favorable circumstances. The new paper company, with its trained executives, experienced in both lumbering and paper making undertakings, adequate resources and wellnigh unparalled opportunities, should go far. The lumber mill interests provide from 400 to 425 tons of saw mill wastes daily and some 50 tons of kiln-dried refuse for use as power plant fuel. The Black Water River, which is navigable for tugs and barges handling the mill's output, provides a plentiful supply of water for both process and power requirements and can be utilized to advantage for bringing in pulpwood.

The mill site is admirably located and well served in respect to rail transportation facilities, being reached by both the Seaboard Airline and Southern Railroad and in addition cared for by some 250 miles of privately owned trackage belonging to the operators of the associated saw mill. The timber supply in the vicinity of Franklin is, furthermore, estimated to be adequate for an indefinite period, if proper cutting methods are employed.

While purchasing much of its pulpwood from neighboring property owners at the present time, the paper mill is also building up substantial timber reserves of its own and can, besides, draw upon the large holdings of the Camp Manufacturing Company. Thus, market conditions determine what portion of the mill's pulpwood can be purchased to advantage and what portion cut on land held either by the paper company or by its affiliated lumber organization.

A sound policy in regards to timber conservation has been adopted, calling for the use of logs of 4-inch minimum diameter. Instructions to outside lumbermen specify timber with a minimum butt diameter of 8 inches, so that wood sizes are fully covered, after allowing for the taper of the logs.

Joint Power House

Another of the distinctive advantages in this southern development is the "pooling" of steam and power supplies for the two plants—the saw mill and the new paper mill. A modern, high-pressure steam plant has been erected on that portion of the paper mill's property adjoining the site of the saw mill and this power house, operating on wood waste from the saw mill, black liquor from the paper mill and supplemented when necessary by the use of auxiliary oil fuel, supplies both steam and electric power to the affiliated plants.

An excellent arrangement of plant structures provides facilities for straight line paper production and the highly efficient utilization of conveyors for handling both the saw mill refuse and the incoming supplies of pulp wood. The power and recovery

plant building is located nearest the saw mill, making the general layout somewhat L-shaped, with the power plant forming the shorter leg and the machine room of the paper mill the upper portion of the longer leg.

The "L" space is utilized for pulpwood storage, with the barking drum and wood room located between this yard reserve and the power plant. The various fuel conveyors—from the saw mill, wood room and barking drum—converge and come together, so that the bark and material rejected from the wood room is combined and mixed with hogged refuse from the saw mill before being delivered to the two wood-burning, power boiler furnaces in the saw mill end of the power plant.

Expeditious Log Handling

The pulp logs are taken from the storage piles and fed to log-haul (30 cords per hour capacity) chain conveyors by a powerful yard crane equipped with a timber grapple and capable of picking up 5-foot logs from a 16 square foot area. This grapple has sufficient closing power to assure full loads even when handling 12- to 14-inch logs in 18-foot lengths. Passing then through a large, 10-foot diameter by 30-foot long, chain-driven F.M.P. barking drum of the wet type, the logs, freed from bark and refuse and washed, are carried by a second chain conveyor to a standard Murray pulpwood disc chipper.

The barking drum, incidentally, consists of longitudinal hot-rolled U-bars welded firmly to heavy ship-channel rings and is driven at 7½ revolutions per minute by a 75-horsepower motor, through reduction gears and an alloy chain passing around the drum. The chipper, also motor driven and of heavy substantial construction, incorporates anti-friction and self-aligning bearing refinements, has micrometer bed knife adjustment and renewable knife cages, permitting the length of chip to be easily changed.

The chips pass from the chipper to a pair of Orville-Simpson chip screens, which screens sort the chips into graded sizes; over-size chips, which pass to a Murray chip crusher for further subdivision before being fed to the digesters; accepted chips, which are carried by belt conveyors direct to the chip storage bin over the digesters; and fines, which are discarded and discharged to the fuel carrier leading to the power plant. The belt conveyors which carry the chips are both 30 inches in width, 51-feet 3-inches and 381 feet between end pulleys respectively, and handle 18 cords of chips per hour, the shorter conveyor running at 250 feet per minute and the other at 220 feet. By speeding up the longer conveyor, which is furnished with a two-way distributing tripper, to 375 feet per minute, 30 cords of chips can be handled during the hour.

Pulp Preparation

From the chip bin, the chips enter three giant, all-welded and X-rayed, Blaw-Knox digesters, each 10 feet 6 inches in diameter and 30 feet 7 inches in height and capable of accommodating a charge in excess of 3,000 cubic feet, where they are cooked at a pressure of 150 pounds per square inch. These digesters are equipped with seatless Yarnall-Waring blow valves, which instead of the customary disc and seat employ a sliding piston plunger that readily cuts through the pulp and securely, tightly, closes the outlet port. A shoulder on the plunger, on cutting off the discharge flow, contacts with the upper follower gland of the blow valve, so the harder the valve wheel is turned after the valve has closed, the tighter becomes the valve. When the valve is open, the piston plunger having been drawn past the outlet port, a clear unobstructed passage is provided for the flow of the cooked pulp, there being no projections or obstructions on which the digester discharge can accumulate or by which the flow can be retarded.

The cooked pulp passes from the digesters to a cyclone and thence through a rotary spout to any one of half a dozen 3,600 foot diffusers built by the Norfolk Tank Corporation, the vapors from the main cyclone being carried over to a dummy cyclone. These high temperature vapors are then carried to a blow-down water heater serving two great 18-foot, 34,000 gallon, cylindrical hot wash-water tanks, from which heater the non-condensible gases escape to the atmosphere and the dirty condensate passes to the sewer.

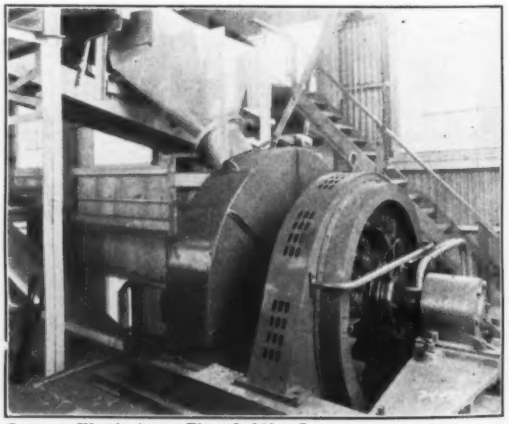
Vapor Condenser

The design of the vertical digester blow condenser, built by C. H. Wheeler Manufacturing Company, is such that less than 30 per cent of the volume of the shell is taken up by the water tubes, numerous clear lanes being provided between the tubes for steam distribution and cleaning purposes. A series of hinged quick-opening covers in the condenser shell opposite these clear lanes give ready access for high pressure washing of the tube surfaces and the top header is provided with a series of washdown nozzles which can be connected to a common water manifold for flushing the tube surface between blows.

Steam is admitted into the eccentric belt on the upper portion of the shell and is prevented from direct impingement on the tubes by a heavy impingement baffle, the steam being directed and distributed around the tube bundle. A series of hinged quick-opening covers on the steam belt and flush-out connections provides means of removing any pulp carried over before it enters the main shell space.

The water passes are so arranged as to avoid eccentric expansion and contraction strains and the entire lower end of the tube bundle is free to adjust itself to expansion and contraction. The construction also permits the removal, when desired, of the entire tube bundle as a unit.

The non-condensable gases are removed from the



Courtesy Westinghouse Elec. & Mfg. Co.

250-HP. SYNCHRONOUS MOTOR DRIVING MURRAY CHIPPER.

lower shell by a concentric belt, arranged so as not to carry over any condensate or pulp.

Diffuser Refinements

To avoid the labor of hosing out the pulp and also in order to secure a better pulp mixture, the six diffusers are provided with Sandberg Automatic Dump Valves placed in the bottom of each diffuser, underneath the strainers. The cones of these valves are keyed to the end of motor-driven hollow shafts which at the other end are connected to a high-pressure water line. The operator on the top floor has simply in one movement to lift up a valve, start the motor and turn on the water and a diffuser is promptly emptied automatically.

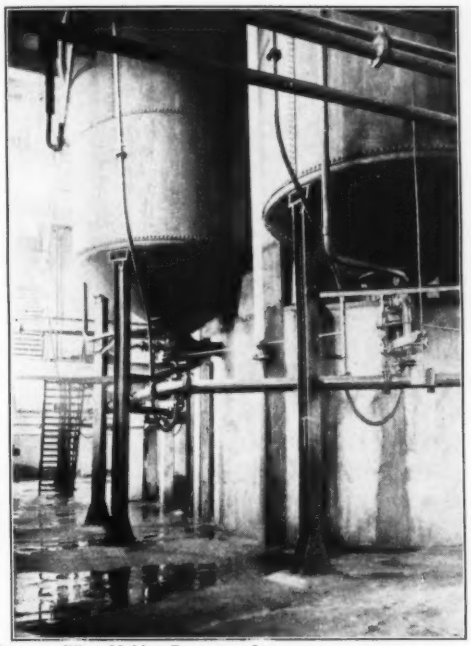
The pulp, on leaving the diffusers, is pumped first into a stock chest and then into a knotter head box, from which latter receptable it passes through "Impco" knotters, screens and a pulp thickener. The stock of controlled consistency is pumped to two knotters adjacent to the inlet flume, each knotter being provided with a 2-horsepower motor driving through an integral worm reduction, though the actual power demand is seldom in excess of about ¾ horsepower. The accepted stock from these knotters is then carried through fabricated steel chutes to a flume ahead of the centrifugal screens, while the tailings drop into a flume below the machines.

Screen Room Equipment

There are four centrifugal "Impco" screens, each equipped with a 50-horsepower driving motor, one of which is a tailings screen, the others, only two of which usually have to be employed to maintain a plant output of 200 tons per day, being primary screens. The tailings from the primary screens are pumped to the tailings screen and the accepted stock from this latter centrifugal joins the previously accepted stock and is carried with it in a wooden flume to a 5-foot diameter by 7-foot face "Impco" vacuum-washer thickener, by which the prepared stock is fed by a screw conveyor to the chest.

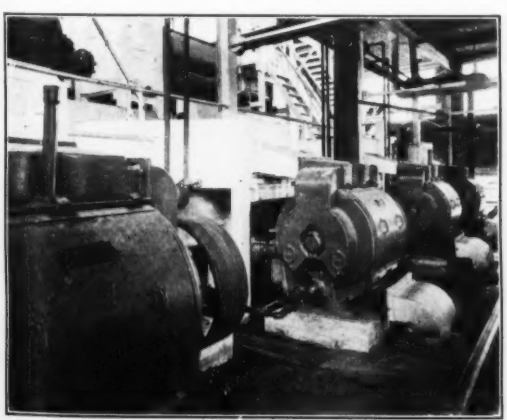
The rejects from the knotters and the coarse screenings from the primary screens are fed to two double-disc, Bauer Brothers, pulpers by a screw and adjustable feeder, the latter device providing close regulation as to rate and character of the refining. These machines incorporate two facing disc heads rotating at high speed in opposite directions. The knots, over-sized and partially cook chips are fed to the refiners between and near the hubs of the slightly dished disc heads, where the separation of the heads is the greatest, and work centrifugally outward toward the circumference, where the disc heads come closest together. The pressing, rolling and squeezing to which the fibrous mass is thus subjected, as it advances and rolls out from between the outer edges of the disc heads, breaks down, or defibers, the knotter and screen rejects without destructive cutting and, since all the material passes ultimately between the closest setting of the disc heads, a uniform quality of pulp, without shives or need of further cooking or other treatment, is secured and delivered to the thickener head box.

From the thickeners, the pulp passes to a battery of five individually driven Majestic (E. D. Jones & Sons Company) jordans, which can be operated in



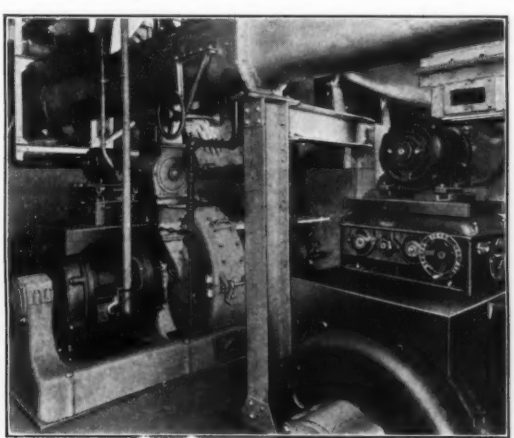
Courtesy Fibre Making Processes, Inc.

DIFFUSERS EQUIPPED WITH SANDBERG AUTOMATIC DUMP VALVES.



Courtesy Improved Paper Machy. Corp.

CLOSE-UP KNOTTERS AND SCREENS.



Courtesy Bauer Bros. Co.

TWO BAUER DOUBLE-DISC PULPERS SERVE FRANKLIN MILL.

various combinations, depending upon the type of paper or board being produced in the machine room. These jordans are driven by 400 horsepower motors and are fitted with roller bearings, assuring close and accurate maintenance of plug setting.

The jordan room also houses a pair of Dilts pulp mixers and three continuous type Dilts breaker beaters—a broke beater for the reconversion of trim and other waste paper into usable pulp, a beater for the wet lapping of pulp for storage or sale, and a beater for newsprint requirements. Dilts blending chests and agitators are also installed throughout the mill, while the paper machine saveall is located near the vacuum decker. This latter unit is an "Impco" machine, 8 feet in diameter by 12-foot face, provided with automatic float control to vary its capacity in proportion to the requirements, and is holding the filtrate loss well under 1/10 pound per thousand gallons.

Paper Making Facilities

The machine room proper boasts one of the most advanced paper machines in kraft production built by The Pusey and Jones Corporation. It is designed for a speed range of from 150 to 1,200 feet per minute and is capable of making paper or board of 210-inch untrimmed width. This large machine, with its great hood, is outstanding and incorporates quite a number of noteworthy refinements, many of which are of general interest and concern. Hence, the following somewhat fragmentary notes on a few of the machine features which command attention.

The flow box of the machine, which is lined with stainless steel, has a 72-inch slice, cypress partitions and feeds two adjustable (100 to 400 shakes per minute) shake sections which are provided with eight flat suction boxes under the wires. These boxes, as well as the suction couch, suction presses, felt condensers, and felt box are served by Nash Hytor vacuum pumps, nine such pumps being provided.

The suction couch roll is 3 feet in diameter, runs on anti-friction bearings and is served by a Nash Hytor vacuum pump. Both pairs of first and second presses, the upper press rolls of which are 2½ feet in diameter faced with 1-inch rubber covering and the lower rolls 32-inch cast brass cylinders, are also equipped with anti-friction bearings. The drier section is made up of forty-eight 60-inch close-grain cast iron rolls, bored and ground, a 42-inch receiving drier and half a dozen 4-foot felt driers. There are also two stacks of calenders, five and seven roll units respectively, and provision has been made for the addition of thirty-six more 60-inch driers when necessary—all driers being designed for 50-pound working pressure.

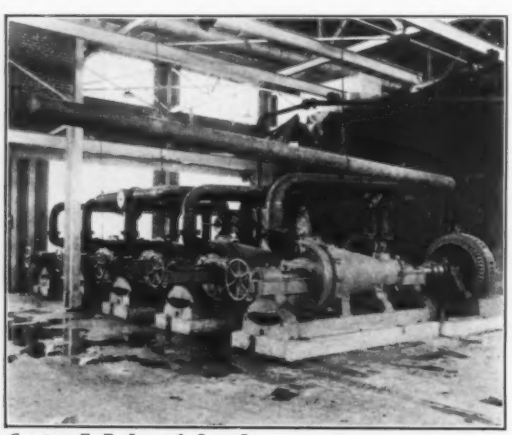
Courtesy Dilts Machine Works, Inc.

CLOSE-UP OF BEATERS.

The great machine hood, about which an efficient J. O. Ross heating and ventilating system centers, is constructed of panels of Transite board fastened by brass countersunk screws to a supporting steel frame. It is set high with deep side curtains, to avoid the need for dormers, and there are three systems of air supply and disposal—a hood exhaust system, a felt supply system and a roof supply system of ventilation.

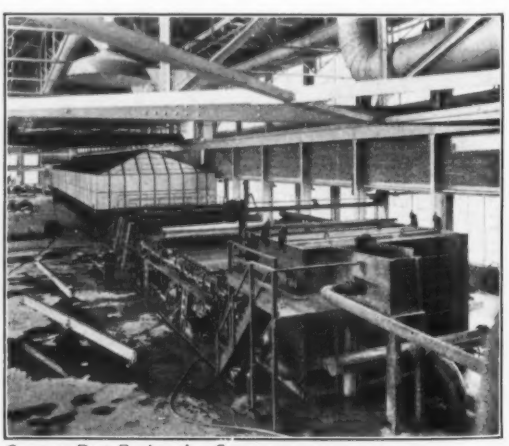
Briefly, the felt system supplies a large volume of drying air directed against the felt through specially designed cross nozzles trained to favor the center portion of the felt. The hood exhaust system, consisting of a series of centrifugal fans located on the mezzanine floor, draws from the top side of the hood; while the roof supply system, which is carefully designed to avoid air pockets, provides a uniform supply of air sufficient to keep the roof dry under all conditions of operation.

A Midwest-Fulton drier drainage system of forced vapor circulation has been installed, with capacity



Courtesy E. D. Jones & Sons Co.

BATTERY OF JORDANS DRIVEN BY 400 HORSEPOWER MOTORS.



Courtesy Rust Engineering Co.

VIEW FROM THE WET END OF 210 INCH PUSEY & JONES FOURDRINIER.

sufficient for eighty 60-inch diameter by 208-inch face driers, the Nash condensate and vacuum pump being able to handle 300 gallons of condensate per minute, at a discharge pressure of 30 pounds per square inch, as well as 11 cubic feet of air. A four-pass countercurrent variety of heat exchanger is located in the condensate line from the flash section of the paper machine.

The roller bearing equipped reel has a 42-inch driving drum and a pair of unwinding stands, provided with efficient dynamic braking as well as with a braking generator. The slitter and Cameron winder, with a 204-inch face, can take a 5-foot diameter roll and attain a speed of 3,500 feet per minute. The finishing section is equipped with a 108-inch face Cameron rewinder, with a left hand drive and a maximum running speed of 2,000 feet per minute, for the accommodation of rolls up to 5 feet in diameter, a 114-inch sheet cutter and a 108-inch layboy.

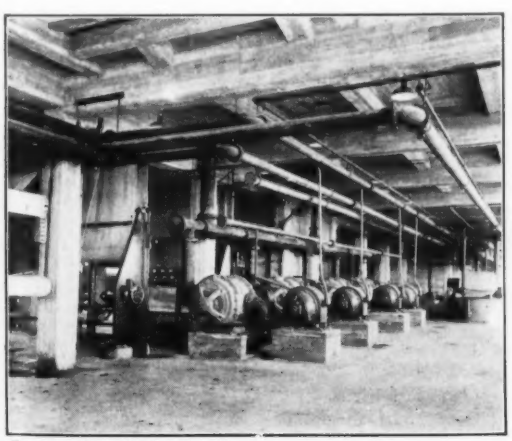
NASH PUMPING EQUIPMENT

Equipment	Application
Drainage pump	Drainage system
Hytor vacuum pump	Calcium carbonate sludge filter
Jennings pump	Priming service
Jennings centrifugal	Condenser condensate
Jennings centrifugal	Chilled water circulation
Hytor vacuum pumps	Suction couch
Hytor vacuum pumps	Suction presses
Hytor vacuum pump	Flat boxes
Hytor vacuum pumps	Felt condensers
Hytor vacuum pump	Felt box

Paper Machine Drive

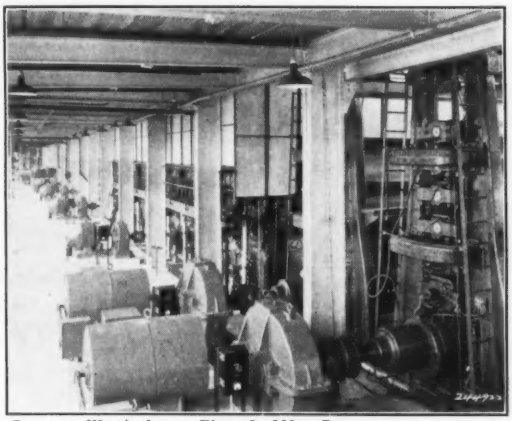
The main paper machine drive, the electrical equipment for which was built by Westinghouse, includes a 750 kilowatt, 250 volt, direct current and a 2,200 volt, 3 phase, 60 cycle alternating current synchronous motor-generator set, with a 2,500 ampere, 250 volt, direct current coupled starting generator. The main direct current generator supplies power to a 250 horsepower motor on the couch, two 75 horsepower motors on the presses, four 75 horsepower motors on the driers, two 200 horsepower motors on the calenders and a 75 horsepower motor on the reel. These section motors are totally enclosed and forced ventilated units, coupled to the respective intake shafts of the paper machine through reduction gears and flexible couplings.

The full operating range of the machine is obtained by armature voltage control, the main generator over a range of from approximately 39 to 250 volts direct current and the sectional motors, individually excited, over the required speed range with constant field excitation under control of differential speed regulators. The speeds of the respective section motors are maintained in correct speed relation by carbon type differential speed regulators which adjust the individual motor field excitation automatically to conform to the load requirements of the section, thus maintaining accurate draws between the various sections of the machine.



Courtesy Rust Engineering Co.

VIEW OF NASH ENGINEERING CO. VACUUM PUMPS.



Courtesy Westinghouse Elec. & Mfg. Co.

SECTIONAL PAPER MACHINE DRIVE. VIEW LOOKING TOWARD WET END.

All sections of the machine are regulated from the master set and the control is of the so-termed "starting generator" type, in which the separate starting generator sets the various sections in motion and brings them to speed prior to their being picked up by the main, or running, generator. This method of control secures correct and uniform "inching" speeds for the individual machine sections regardless of what may be the operating speed of the machine. Besides which, the starting generator control relieves the main generator of the heavy initial load and so, consequently, avoids disturbances to the operating speed of the machine.

The main generator and constant voltage exciter are provided with a variety of electronic voltage regulator, a device which is not only extremely sensitive but, having no moving parts, seldom requires adjustment. The regulators serve to maintain the operating speed of the machine substantially constant regardless of any ordinary frequency disturbances and load variations.

This markedly flexible machine drive is provided with a master control station, which includes fast, slow and stop push button switches and a speed indicator. Each of the individual machine sections is provided with start, stop, inch, lock safe and run push button switches and a synchro-tie type of draw adjusting mechanism. These devices are located on the front side of the machine and, in order to provide for any operating contingency, are placed at various strategic points.

Winder Drive

The drive of the Cameron winder serving the paper machine includes a 175-kilowatt, 250 volt, direct current and a 2,200 volt 3 phase, 60 cycle, alternating current induction motor-generator set with direct connected 7½ kilowatt, 250 volt exciter, a 65 kilo-

watt, 100 volt, direct current, 103 to 845 revolutions per minute, braking generator and a 200 horsepower, 362 to 725 revolutions per minute, 250 volt, direct current winder motor, with a comprehensive system of alternating and direct current control and automatic tension regulation.

For the control of the winder, the driving motor of which is connected to the unwinding stand through a side-connecting coupling, a centralized control is provided, including a master drum switch and speed control rheostat, a tension adjusting rheostat and ammeter, and slack-take-up, inch and emergency stop push button switches. Any slack in the sheet between the winder and unwinding stand can be taken up and tension placed on the sheet when the winder is at rest by simply depressing the slack-take-up button. For spotting or for splicing rolls, the winder may be inched by depressing the inch button.

Tension is placed on the sheet in starting by depressing the slack-take-up button and then moving the drum switch to its first position. The low initial winder speed necessary to form a tight core is thus secured. Tension on the sheet is then adjusted by the manipulation of the tension control rheostat, after which the regulator adjusts automatically the excitation of the braking generator, which is also connected to the unwinding stand by means of a side-connecting coupling, to maintain substantially constant tension on rolls varying in diameter from 16 to 60 inches. Increased operating speed is then obtained by advancing the drum controller.

The winder may be stopped either by returning the drum controller to its "off" position or by depressing the emergency stop button, either operation applying dynamic braking to both the braking generator and the winder motor. The energy, which with the conventional form of friction brake would be dissipated in brake lining wear, is returned to the winder through the braking generator, thus eliminating annoying and costly brake maintenance.

Recovery of Chemicals

There are many other features of interest in the machine room: the heating of the screen and beater rooms by high-velocity unit heaters and of the finishing room by low-velocity unit heaters; the crane equipment and the freight elevators in the finishing room, digester building and causticizing house; to mention a few. Chief interest centers, however, in the recovery of chemicals, starting with the concentration of the weak black liquor in the great Swenson evaporator in the power house.

This unit is a six body affair of the long-tube type, quintuple effect, of welded steel construction with steel tubes and an evaporating capacity of 88,100 pounds of water per hour, where the black liquor concentration is raised from about 17 to 55 per cent solids, prior to being stored in three large black liquor tanks. Two of these reservoirs are of 44,000 gallon capacity each, while the smallest accommodates 34,200 of strong black liquor.

A bucket elevator is utilized to raise the salt cake from its storage house to the feeder bin, where the charge is prepared for the recovery unit furnace. That is, the sale cake is added to the strong black liquor at this point.

The black liquor mixture is then sprayed into the furnace of the recovery unit by oscillating jets and impinges against the walls of the combustion chamber, partial dehydration taking place during the flight of the chemicals across the furnace. The liquor deposited on the furnace walls then becomes completely dehydrated and the black ash drops to the furnace hearth, where a limited supply of air is admitted to support partial combustion. During this distillation process, the products of combustion rise to the upper portion of the furnace, passing through the sprays of black liquor, where further air is admitted to assure complete combustion of carbon monoxide and such hydrocarbons as are distilled from the black ash. The recoverable chemicals in the black ash melt and flow through a tap hole, subsequently passing on to the causticizing plant for further treatment.

The equipment in this latter plant, where the reclamation of lime mud and green liquor is effected in a continuous and highly economical Dorr recausticizing system, includes two causticizing tanks, seven white liquor tanks, a dozen settling tanks, two lime mud tanks, three filtrate tanks and a continuous Oliver lime-sludge filter equipped with a Nash vacuum pump.

Power Boiler Fuel Supply

To supply fuel to the power boilers, saw-mill refuse is first hogged at the plant of the Camp Manufacturing Company and is then carried by a chain conveyor to the adjoining property of the paper plant, where it is transferred to a distributing conveyor. This second conveyor serves the fuel storage house, where the dry refuse from the planing mill, delivered by means of a blowpipe system, is added, the outside fuel storage reserve and two 5,000 cubic foot storage bins in the boiler house. A third conveyor, running from the outside storage space and under the storage bins, takes the fuel material to a point near the adjacent barking drum and wood room, where the bark and rejects from the screenings of the pulp wood are added to the hogged saw mill refuse, and a fourth conveyor carries the fuel mixture to the storage bins in the boiler house. Finally, a spiral conveyor pushes the fuel from these bins to the wood stokers firing the boiler furnaces.

Steam Generating Equipment

The steam generating equipment consists of two large B. & W. integral-furnace power boilers, each capable of generating 70,000 to 80,000 pounds of high-pressure steam per hour when fired on wood fuel, and a black liquor B. & W.-Tomlinson recovery unit operating on black liquor, by which an additional 50,000 pounds of high-pressure steam per hour is supplied. Altogether, the steam generating capacity of the plant, all steam generating units of which produce steam at a working pressure of 425 pounds per square inch and a temperature of substantially 675 degrees Fahrenheit, amounts to 210,000 or 290,000 pounds per hour, depending upon the kind of fuel used to fire the power boilers—provisions having been made to operate these latter boilers on fuel oil, when and as required. So fired, each of the power boilers can generate as much as 120,000 pounds of high-pressure steam during the hour.

Since the hogged saw-mill refuse fuel burned under the power boilers has a moisture content of about 50 per cent as fired, these boilers have been provided with specially designed (M. A. Hofft) wood stokers. In operation, the fuel slides down inclined grates, drying out somewhat before the wood reaches the combustion zone—about 30,000 pounds of such fuel be-

ing consumed per boiler per hour. The three burners per boiler employed when operating on oil fuel are also somewhat special. They are of the B. & W. forced-draft circular type and can be used for burning pulverized coal, as well as oil, should the powdered fuel be employed at some later date.

Each of the power boilers presents 14,098 square feet of heating surface and is designed for a steam pressure of 450 pounds per square inch. Each is provided with a loop-tube type superheater to give a total steam temperature of 675 degrees Fahrenheit at maximum boiler capacity with combination oil- and bark-fuel firing.

The recovery unit is a three-drum waste-heat boiler, having 9,120 square feet of heating surface, designed for a steam pressure of 450 pounds per square inch, and capable of generating 51,900 pounds of steam per hour. It is provided with an inverted loop-tube type superheater to give 675 degrees Fahrenheit total steam temperature at maximum capacity, and a welded-element type air heater presenting 6,970 square feet of heating area. The furnace and connection flue between the furnace and boiler are completely water-cooled, some 2,307 square feet of exposed surface being protected in this manner.

The induced draft fan which discharges the products of combustion to a great 14-foot diameter reinforced concrete stack, 250 feet in height, handles 167,000 pounds of gas per hour, or 50,000 cubic feet per minute at 250 degrees Fahrenheit at 9.6-inch static pressure. It is a double width, double inlet Sturtevant unit, with rectangular inlet boxes, running at 1,160 revolutions per minute. At this speed, it develops a top speed of close to three miles per minute.

The forced draft fans with which the three steam generators are supplied are also Sturtevant units and handle 113,500 pounds of air per hour, or 26,800 cubic feet per minute at 12-inch static pressure at 100 degrees. They run at 1,750 revolutions per minute and attain an even higher top speed than does the induced fan.

Remote control devices govern the supply of air to the power boilers, a full complement of Bailey boiler meters, multi-pointer gauges and feedwater regulators being provided, as well as Bailey steam and water distribution meters for recording and integrating input and output. The recovery unit is under complete Bailey automatic equipment control from a panel board on which are mounted:

Black liquor boiler meter to indicate, record and integrate the black liquor flow and record both the air flow and liquor nozzle supply pressure.

Steam flow meter to record and integrate steam flow and record heated air and exit gas temperatures.

Recorder to record steam temperature and steam pressure and record the temperature of the feedwater.

Multi-pointer gauge to indicate forced draft, induced furnace draft, differential pressure through boiler, differential pressure through air heater, induced draft at fan inlet and differential pressure through the economizer.

These instruments and controls are in addition to the conventional steam and feedwater pressure gauges on the board, pump and fan start and stop push button switches, signal lights for forced and induced draft damper positions, and a Bailey hand-automatic selector valve by which the control of the unit may be made manual or automatic.

Manual Combustion Control

For the hand regulation of the oil and wood supplies and of the respective volumes of air supplied for the fuels, Hagan Corporation manual controls have been installed, the operation of which are substantially as follows: The controlling element for each boiler, in the first place, is actuated by means of a pneumatic loading pressure established by an individual manually regulated valve at the boiler panel, where a calibrated indicating gauge guides the operators in making the necessary valve adjustments.

One manual control valve transmits its loading pressure to a power device for controlling the primary air supply to the bark-burning furnace and a similar valve provides control of the secondary air to the same furnace. Forced draft to the oil burner is controlled in like manner, as is also the position of the boiler uptake damper, while the control of the oil supply to the burners is effected by diaphragm operated oil control valves which receive their loading pressures from individual manual control valves.

The Hagan Corporation also provided the constant pressure control for the Elliott deareating feedwater heater. This regulation is effected by a diaphragm type regulator of the integral compensating type, which establishes a pneumatic loading pressure in accordance with any pressure variations within the heater. The developed loading pressure actuates a steam control valve of the bellows operated variety, by which the admission of 60 pound steam is regulated so as to maintain a constant pressure of 3 pounds per square inch in the dearerating heater.

Steam Supplies

As the steam requirements of the saw mill and the paper mill vary widely, both in respect to required steam pressures and demand, which variations are augmented still further by the fact that one of the mills operates intermittently while the other is in continual activity, an exceedingly flexible and well planned arrangement of two large Westinghouse turbo-generator units has been installed, one of the condensing variety and the other noncondensing. With this set-up, steam can be bled from either turbine as required and the exhaust from the noncondensing unit utilized as well. By so doing, it is possible to maintain at all times a satisfactory balance in power and steam supplies, by adjusting the loads carried on the respective turbines.

Both turbo-generators are 2,300 volt, 3 phase, 60 cycle units rotating at 3,600 revolutions per minute. Steam is extracted from the non-condensing turbine, which unit drives a 3,000 kilowatt (3,750 Kva.) generator, at a gauge pressure of 150 pounds per square inch, the turbine exhausting into a low-pressure steam header at a gauge pressure of 60 pounds. From the condensing turbine, which drives a 3,500 kilowatt (4,375 Kva.) generator, steam is extracted, or bled, at 60 pounds gauge, with the turbine exhausting to a condenser at 28-inch vacuum.

Both turbines are supplied with steam from the several boilers fed into a 400-pound steam loop, the non-condensing unit furnishing the steam for the 150-pound header and part of the steam supply to the 60-pound header, by extraction and exhaust, while the

condensing turbine unit bleeds at 60-pound pressure into the lower pressure header. The 150-pound header supplies steam to the saw mill, the power plant auxiliaries and the pulp mill, while the 60-pound header provides steam for the paper machine, evaporator and a closed feedwater heater. In addition, exhaust steam at 5 pounds gauge pressure from fan and pump turbines serves a deareating heater.

Furthermore, in order to guard against any lack of balance in the supply of steam in either of the headers, a reducing valve and desuperheater automatically feeds steam from the main steam loop into the 150-pound header, should the supply of steam at this pressure be inadequate. Similarly, any lack of 60-pound steam is automatically taken care of by passing steam from the 150-pound header through another reducing valve. Relief valves and regulators are provided at suitable points on both the 150- and 60-pound steam header, as well as in the primary steam supply line.

Mason-Neilan 6-inch and 2½-inch, cast steel, pilot operated steam-pressure-regulators, reducing saturated steam from 425 to 150 pounds pressure, for desuperheating, digester supply, etc., are in make-up service to the turbine exhaust system, the smaller regulator in continuous use, with the 6-inch regulator operating only when the turbine is inoperative. Two similar 6-inch, cast iron, pilot operated steam-pressure-regulators in parallel reduce 150 pound saturated steam to 60 pounds for the paper machine line, while two other of these 6-inch regulators, also in parallel, reduce 60-pound saturated steam to 30-pound pressure for evaporators, etc.

A Mason-Neilan recording-temperature-controller governs the flow of water to the desuperheater station in the 150-pound steam main through a ¾-inch direct-acting control valve and a similar instrument controls the steam flow to the paper driers, through a 12-inch reverse-acting, erosion resisting, control valve.

Three pressure-temperature-recorders on the sulphate digesters post the temperature of the cook continuously and the pressure of the gas. An indicating Mason-Neilan flow-controller also governs the steam flow in the main line to the digesters through a 6-inch, reverse-acting control valve.

In this way, with the many equipment refinements, it is possible to meet wide fluctuations in demand for either steam or power on the part of either of the two large plants which draw upon the common power house. Both steam and electrically driven auxiliaries have also been installed quite generally, as a further means of maintaining at all times and under all circumstances suitable steam and power demand balances.

Water Supplies

A 6,000 gallon per minute pump takes water from the Black Water River for both boiler-feed and mill water supplies, the boiler-feed water being well filtered by passage through two large A. D. Wood machines and then given zeolite, sulphate, sulphite and phosphate treatments and further purified by going through the previously mentioned Elliott deaerator, which unit has a capacity of some 200,000 pounds per hour. Part of the paper mill service water supply is also treated by being carried through the condenser and generator air coolers before being heated for paper plant use.

The main water reservoir is a great steel tank, 85 feet in diameter and 20 feet high, while the water for fire protection is stored in a 100,000 gallon elevated steel tank, a 1,500 gallon per minute fire pump being provided. Both these large tanks were built by the Chicago Bridge & Iron Company. Drinking water, piped throughout the plant, is obtained from a well drilled down to the almost unlimited amount of ground water which underlies the Franklin district. This well furnishes about 100 gallons of water per minute and is pumped continuously, the various drinking lines, pressure on which is maintained by relief valves, overflowing at the ends.

Typifies Important Advance

While there are still many other noteworthy features and efficient equipment units well deserving of mention in the Chesapeake-Camp Corporation plant—such as the Mesco stock consistency regulator, Toledo scales for weighing the paper rolls as they come off the machine and for determining ream weights, Fairbanks warehouse scales, instruments and controllers of various kinds and makes, a Rogers automatic knife grinder, machine clothing and the large Ingersoll-Rand compressor furnishing a plentiful supply of compressed air for pneumatic tools, motor and paper machine blowing, diaphragm valve manipulation, paper machine oiling, lacing boilers, etc., to mention but a few of those which space limitations prevent discussing in detal—the foregoing is a fairly comprehensive, though necessarily sketchy, description of the new plant at Franklin, Va., a plant which well typifies recent, important advance in kraft, paper and board, production. Designed by J. E. Sirrine & Co., of Greenville, S. C., the construction work on the well planned brick and steel buildings and the attractive colonial office building, the purchase and installation of the carefully selected—on its merits—equipment were carried out under the able direction of the Rust Engineering Company of Pittsburgh.

The various sub-contractors and builders of installed equipment also deserve much credit for the successful consummation of a truly outstanding undertaking. The Chesapeake-Camp Corporation now has the plant with which to attain and hold a dominant position in the paper making field.

The Officers of the Company

The officers of the company are as follows:

Board of Directors: J. L. Camp, Jr., President, Camp Manufacturing Company; Elis Olsson, President, Chesapeake Corporation; H. W. Ellerson, President, Albermarle Paper Manufacturing Company; Julien H. Hill, President, State Planters Bank and Trust Company, Richmond, Va.; John M. Camp, Vice-President, Camp Manufacturing Company; P. R. Camp, Vice-President, Camp Manufacturing Company; Hugh D. Camp, General Manager, Chesapeake-Camp Corporation; W. C. Gouldman, Secretary and Treasurer, Chesapeake-Camp Corporation.

Officers: J. L. Camp, Jr., President; Elis Olssen, Vice-President; H. W. Ellerson, Vice-President; John M. Camp, Secretary and Treasurer; Hugh D. Camp, General Manager.

J. E. Sirrine & Co., Greenville, S. C., Designing and Supervising Engineers.

Rust Engineering Company, Pittsburgh, Pa., General Contractor.

The list of Sub-Contractors and Manufacturers of the Principal Equipment in the new mill follows:

Salute to Success

IT has been our privilege as the designing and supervising engineers for the Chesapeake-Camp Corporation's new plant at Franklin, Virginia, to have had some part in the finished pulp and paper mill as it stands today. We are proud to have been associated with this work.

J. E. SIRRINE & COMPANY

Engineers

GREENVILLE SOUTH CAROLINA

Sub-Contractors and Manufacturers of the Principal Equipment

Refuse, log and chip conveyors	Chain Belt Co.
Knotters tailing conveyors	Jeffrey Manufacturing Co.
Conveyor belting	New York Rubber Corp.
Barking drum	Fibre Making Processes, Inc.
Chipper and chip crusher	D. J. Murray Manufacturing Co.
Chip screen	Orville-Simpson Co.
Evaporators	Swenson Evaporator Co.
Digesters	Blaw-Knox Co.
Pumps	Allis-Chalmers Manufacturing Co.
Vapor condenser	C. H. Wheeler Manufacturing Co.
Diffusers and tanks	Norfolk Tank Corp.
Diffuser dump valves	Fibre Making Processes, Inc.
Digester blow valves	Yarnall-Waring Co.
Knotters, screens and thickener	Improved Paper Machinery Corp.
Refiners	The Bauer Bros. Co.
Pulp mixers and breaker beaters	Dilts Machine Works, Inc.
Jordans	E. D. Jones & Sons Co.
Vacuum saveall	Improved Paper Machinery Corp.
Paper machine	Pusey & Jones Corp.
Drier drainage system	Midwest-Fulton Machine Co.
Vacuum pump	Nash Engineering Co.
Machine clothing:	
Drier felts	William E. Hooper & Sons Co.
First press felts	Waterbury Felt Co.
Second press felts	Albany Felt Co.
Fourdrinier wires	Appleton Wire Works
Felt conditioners	Bird Machine Co.
Winder and rewinder	Cameron Machine Co.
Press rolls	Stowe-Woodward, Inc.
Knife grinder	Samuel C. Rogers & Co.
Causticizing equipment	The Dorr Company, Inc.
Lime sludge filter	Improved Paper Machinery Corp.
Scales	Toledo Scale Co.
	Fairbanks-Morse Co.
Cranes	Northern Engineering Works,
Elevators	Westbrook Elevator Mfg. Co.
V-belt drives	Gates Rubber Co.
Machine hood, heating and ventilating system	J. O. Ross Engineering Corp.
Recovery unit	The Babcock & Wilcox Co.
Forced and induced draft fans	B. F. Sturtevant Co.
Concrete stack	Rust Engineering Co.
Power boilers	The Babcock & Wilcox Co.
Wood burning stoker	M. A. Hofft Co.
Fire brick	A. P. Green Fire Brick Co.
Insulation	Guy M. Beaty
Deaerating and closed heaters	Elliott Co.
Boiler meters and flow meters	Bailey Meter Co.
Instruments	The Foxboro Co.
Combustion control equipment	Hagan Corp.
Regulators	Mason-Neilan Regulator Co.
	Merritt Engineering & Sales Co.
	Northern Equipment Co.
Turbo-generators	Westinghouse Electric & Mfg. Co.
Condenser	Allis-Chalmers Eng. Co.
Motors	Westinghouse Electric & Mfg. Co.
Air compressor	Ingersoll-Rand Company
Power and light wiring	Allegheny Industrial Electrical Co.
Piping	Pittsburgh Piping & Equip. Co.
Water softening, filter plant	Roberts Filter Mfg. Co.
Water filter screens	Glen Falls Machine Works
Water tanks	Chicago Bridge & Iron Works
Insulation and pipe covering	Phillip Carey Co.
Boiler settings	Rust Engineering Co.
Valves	Chapman Valve Co.
	Edward Valve & Mfg. Co.
	Merco-Nordstrom Valve Co.
	Valley Iron Works
Steam traps	Armstrong Steam Trap Co.
Lumber, Wolmanized	Camp Manufacturing Co.
Structural steel	Bethlehem Steel Co.
	The Ingalls Iron Works Co.
	The Levinson Steel Co.
Ornamental Iron	Superior Iron & Wire Works
Well	Sydnor Pump and Well Co.

DANGER TO SOUTHERN PINE

(Continued from page 37)

will largely increase our timber supply, so that it will be ample for not only the consumption requirements of our present forest industries, but also the additional pulp and paper mills that the South needs, to supply our country's requirements.

Great Increase in Timber Resources

"An indication of the great increase in southern timber resources, that effective fire protection will assure, is given in a recent publication of the Agricultural Extension Department at Auburn, Ala., which reports the results of seven years' experiments with fire on cut-over timberlands. On one area the forest was burned over every March for seven years. On another area it was burned over every five years. And, on a third area the fire was kept out. The area burned over every year for seven years now has only 8 per cent of a stand of trees. The area burned over every five years has only 20 per cent stand. While the area kept free from fire has a 130 per cent stand, or more than the number required to make a good stand. If all the Alabama woodlands were handled as in the number one area, the estimated value of standing timber would be $2,000,000. Or, if handled as in the number two area, it would be $5,000,000. While, if handled as in the number three area it would be $25,000,000.

Estimated at $10,000,000

"In Georgia, whose pine timber resources are greater than those of any other southern state, and from which more than half of our total gum naval stores production is secured, the forest fire losses suffered during the last season, are estimated by State Forester Frank Hayward, Jr., at approximately $10,000,000. As our state's pine forests can be more than quadrupled by reforestation and effective fire protection, it is evident, as for some years constantly and urgently advised by Dr. Herty, that county-wide fire protection for southern forests, is our greatest and most fundamental need.

A Short-sighted Policy

"In respect to southern pulp and paper mills, and their forestry policy and operations, while some of the earlier southern mills, apparently secured what pulpwood they required, without thought as to the forestry cutting operations and the effect on tributary timberlands, yet this was soon demonsrated a short-sighted policy. Now, they realize the need and warrant for the conservation, reforestation and perpetuation of southern forests generally. Also, that county-wide fire protection for forests is the fundamental need. The recent adoption by the associated southern pulp and paper mill companies of a constructive forestry program, and their endeavor to have it generally followed in cutting operations, is the most advanced and effective action yet taken by any southern forest industry. Their large investments of capital, in southern mills and tributary timberlands, is the best possible assurance of their cooperation in following and making effective, a constructive forestry program and operations. They should be commended and supported in their forestry program, not referred to as requiring government regulation, in the public interest.

An Excellent Forestry Program

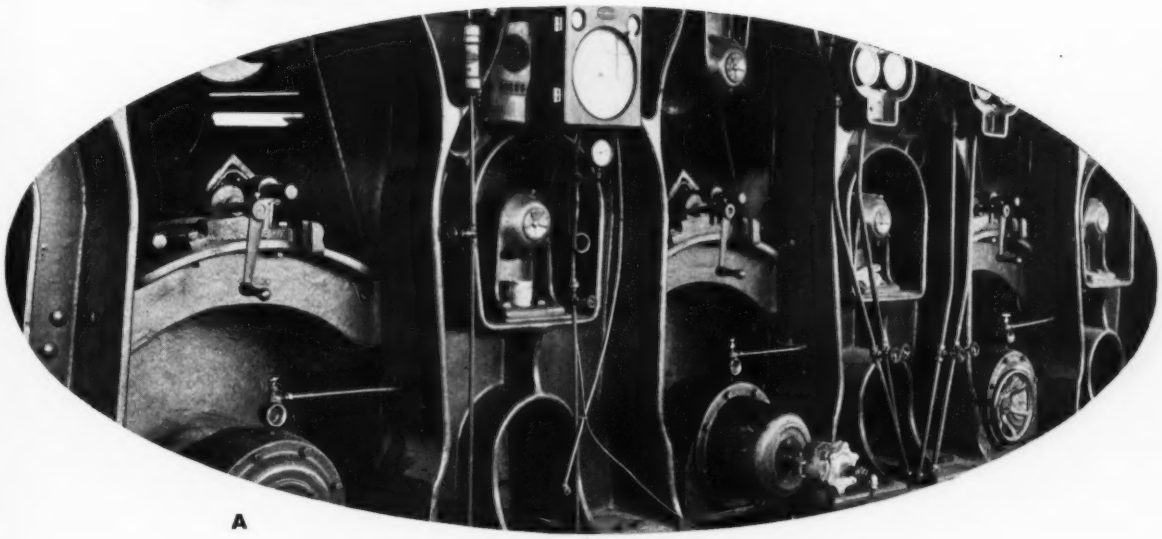
"Recently, an industrial forester from one of our large railroads, after inspecting some of the timberlands and cutting operations of one of our largest southern mills, stated: 'I was very much impressed with the excellent forestry program your company has under way. I saw some good timber cutting, of the type that will keep your lands continually productive. Also, a tremendous amount of young growth, with fire protection.' To which he added: 'Fire protection is of course fundamental to timber growing. If the woods are kept free from burning, we need never fear a timber shortage.'

Fire Protection Is Chief Concern

"The forest manager of a 200,000 pine timber forest in Georgia, which has effective fire protection, states, that the fire loss on that large forest during 1937, was less than one-half of one per cent, and he added: 'Our chief concern is that of fire protection, and let as many mills come as will'."

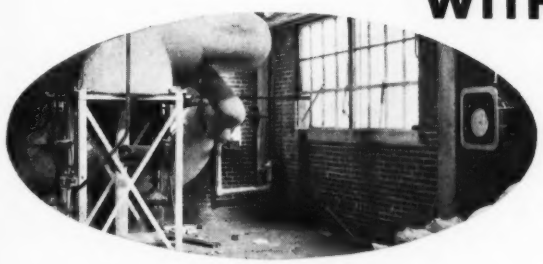
CHESAPEAKE-CAMP

GUARDS QUALITY



A

WITH MODERN CONTROLS



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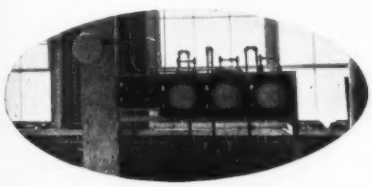

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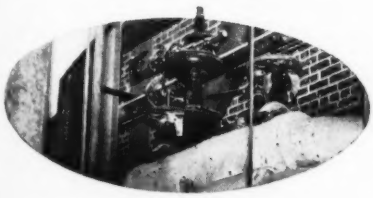


D

Control units at the new Chesapeake-Camp mill exemplify the completeness of the modern Masoneilan line: a line developed by engineers who know paper making problems; a line which offers equipment for control of all process factors from power house to paper machine; a line which has won the preference of engineers and superintendents in a score of United States and Canadian mills. Illustrated are—

A. Masoneilan temperature control on dryers.

B. Masoneilan temperature control at desuperheater.

C. Masoneilan pressure-temperature recorders and indicating steam flow controller for digestors.

D. Masoneilan No. 27 pressure reducing valves used on primary and secondary steam lines.

Whether your problem lies in power house, pulp mill, bleach plant or paper mill investigate Masoneilan Controls—the complete, modern, engineered line.

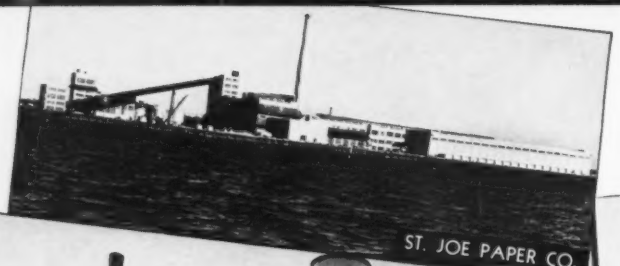
MASONEILAN **1181 ADAMS STREET, BOSTON, MASS., U. S. A.**

New York Philadelphia Pittsburgh Chicago St. Louis Tulsa Houston Los Angeles

B & W-Tomlinson Units and Integral-Furnace Boilers

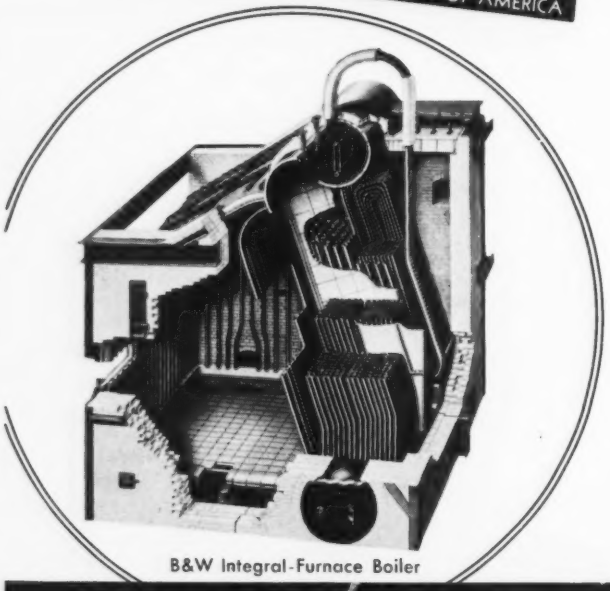
Installed in these four *modern* Pulp Mills

BRUNSWICK PULP & PAPER CO.


ST. JOE PAPER CO.

KRAFT CORP. OF AMERICA

CHESAPEAKE CAMP CORP.

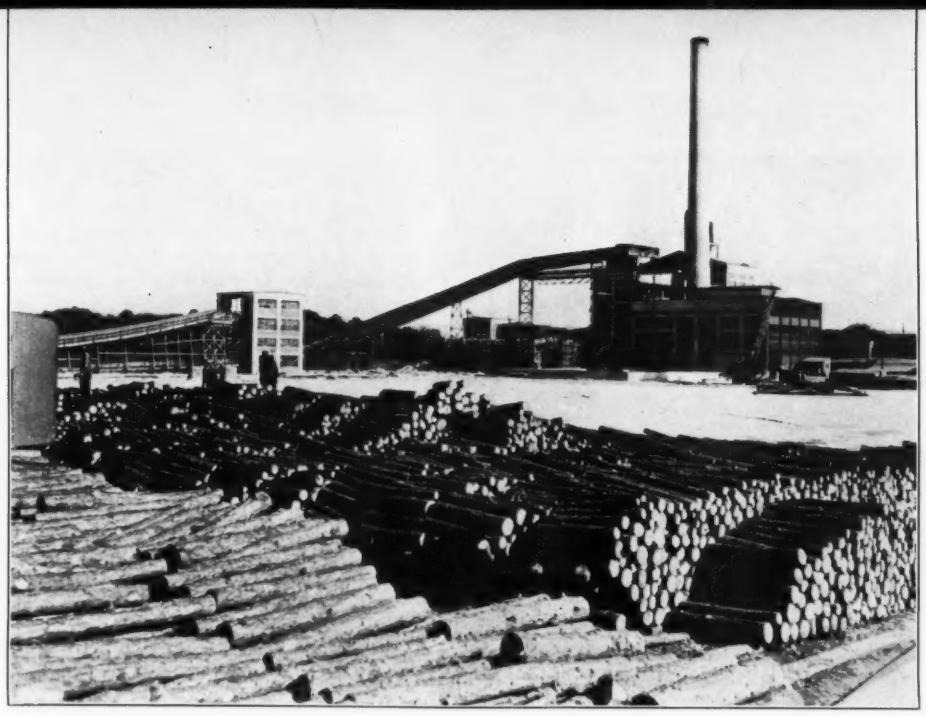

B&W Integral-Furnace Boiler

To provide maximum chemical recovery and reduction, with low maintenace costs and minimum labor requirements per ton of capacity, B&W-Tomlinson units totaling 730 tons of pulp per day (equivalent capacity) were selected for the mills pictured above.

And for economical power, eight B&W Integral-Furnace Boilers, having a combined maximum continuous steaming capacity of 704,000 lb. per hour, are installed in these mills. All can use available fuels of lowest cost. Seven will burn oil and bark; one will be oil fired. All will have provision for pulverized coal in the future.

THE BABCOCK & WILCOX COMPANY
85 Liberty St. New York, N. Y.

BABCOCK & WILCOX



Container Corporation of America

Fernandina, Florida

The great towering Container Corporation stack, which dominates the northern end of historic Fernandina, Fla., is well fulfilling its promise. Last summer, it reared its majestic 250 feet above skeleton frameworks of what has become one of the best equipped of modern pulp producing plants. Then the immense chimney stood out as a beacon of hope for better times to the second oldest settlement in the country, of rejuvenation to a community proud in past glory but sadly run down at the heels. Today, it stands over one of the key spots in the migratory southern movement of the pulp and paper industries, in the utilization of the almost limitless acres of southern slash pine—to the decided benefit of the entire nation, as well as to the Southland.

Built at a cost of between $2,500,000 and $3,000,000 by the Container Corporation of America, with its headquarters in Chicago and producing mills in Pennsylvania as well as throughout the mid-west, the plant typifies and embodies features which are the outcome of years of experience in pulp and paper making activities and of advances of demonstrated merit in pulp production. So far as innovations are concerned, the Fernandina plant has adopted only those modifications in usual methods, equipment and practices as tend to coordinate to better effect the various steps and processes in pulp making, which resolve production into a smooth, efficient, economical, uninterrupted and orderly flow of material from the wood yard to the great pulp press, as served by a modern high-pressure steam plant operating on low-cost fuels.

This decidedly outstanding plant was designed by George F. Hardy and erected by Merritt, Chapman & Scott Corporation, interests well qualified by experience to carry out successfully the comprehensive plans demanded for an undertaking launched by recognized leaders in the paper field. Each detail has been carefully weighed and fitted into the whole with painstaking attention, each unit in equipment selected on its merits and installed with due regard to every other unit, before and behind, so that a description of the plant as a whole lends itself naturally to a collection of brief notes on various phases of plant operation.

Steam Generation

The high-pressure steam plant, by which marked economies in both steam and power generation are attributable, commands first and most detailed attention. It consists of one B&W Integral-Furnace power boiler with a Hofft extension bark-burning furnace, arranged for combination oil- and bark-burning, and a B&W-Tomlinson recovery unit operating on concentrated black liquor, both of which steamers are designed to generate steam at 650 pounds per square inch and to operate at 615 pounds per square inch pressure, the steam being raised to a total temperature of 725-750 degrees Fahrenheit at the superheater outlets of the respective steam generators.

The power boiler has a maximum capacity of 76,200 pounds of this high-pressure, high-temperature steam per hour, 45,000 pounds from bark burning and 31,200 pounds generated by oil. The furnace volume is a matter of 4,056 cubic feet and the boiler heating surface measures 8,826 square feet. The superheater is of the inverted loop-tube type and the combustion air supply is preheated by passage through

a B&W welded-element air heater having a heating surface of 3,410 square feet, designed to give a final air temperature of 298 degrees F. at maximum boiler rating. The burners with which the power boiler is furnished are of the B&W circular type and can be utilized to burn pulverized coal, as well as oil, should the powdered fuel be used at some later date.

Since the exceedingly high temperature developed in the furnace of this unit subjects the refractories to unusually severe service, Laclede flat suspended arches have been installed. The construction of these arches is simple and rugged, the tile supporting castings from which the tiles are loosely suspended being bolted securely to heavy steel cross members to assure positive tile alignment. The hanging tiles, moreover, are free to adjust themselves to the thermal conditions in the furnace and, hence, are rarely troubled with expansion cracking and resulting tile failure. Repairs, when necessary, are readily made, a removable lift tile being provided in each course to permit the easy replacement of any damaged tile.

The recovery unit is a 3-drum B&W waste-heat boiler with a maximum steaming capacity of some 47,600 pounds of high-pressure, high-temperature steam per hour capable of burning 27,200 pounds of black liquor concentrated to 55 per cent solids per hour, the equivalent pulp production of which is, based upon 2,750 pounds of solids per ton of pulp, 130½ tons per day. The furnace volume of the unit is 5,000 cubic feet and the boiler heating surface some 8,200 square feet. The boiler is furnished with water-cooled furnace walls, the fully studded area of furnace walls being 1,280 square feet, partially studded area 820 square feet and the bare tube area 225 square feet.

The recovery unit superheater is likewise of the inverted loop-tube type, designed to give a total steam temperature of 725 degrees F. at maximum rating, while the welded element air heater has a heating surface of 6,360 square feet. This latter accessory is designed to give a final air temperature of 363 degrees F. at maximum rate of steam generation.

Boiler Accessories—Fuel Treatment

Each of the steam generators is furnished with Diamond "loose window" flat glass gauges and water columns, permitting the application of heavy cover plate pressure on the packing and mica to prevent leakage without danger of straining or breaking the glasses. Fifteen Diamond revolving soot blower units, a stationary unit for the boiler and four swinging arm blowers for the air heater are other accessories which make for high and sustained boiler efficiency.

The treatment to which the fuel oil is subjected is also a consideration in the economical operation of the plant, the fuel oil tank being provided with highly effective and economical Griscom-Russell heating elements. These elements consist of a number of U-shaped steel pipes through which the heating steam passes which have longitudinal, radiating fins along the straight sections of pipe. These fins are securely fastened and equally spaced about the circumference of the pipe, increasing the heat-transmitting surface of the pipe four to six and a half fold, as compared with the same length of bare pipe.

This much greater heat liberating area reduces the density of the cold viscous oil fed to the tank in, it is reported, a small fraction of the time required when the heating is done by a bare tube heater of similar size. Consequently, heating steam consumption is held at a minimum, especially as the finned heating elements are located in the tank so as to heat the oil locally at the point of its withdrawal from the tank.

As no cross baffles are necessary in the heater shell, which shell with the heating elements extends into the oil storage tank, there is little oil pressure drop and, with the steam, drain and oil connections outside the tank, the flow of oil into and out of the heater shell is materially facilitated. These refinements make for a compact, effective and highly economical heating unit.

Combustion Control—Feedwater Treatment

The same highly effective system of Bailey combustion control as described in the account of the Brunswick Pulp and Paper Company steam plant is installed at Fernandina—as it is in most of the up-to-date Southern mills. The Container Corporation system differs from that at Brunswick, however, in that the control is entirely automatic, the boiler meter automatically regulating the amount of air supplied to the bark burning furnace, as well as the air flow to the oil burners and the combustion air furnished the black liquor recovery unit. Bailey feedwater regulators, desuperheating and pressure reducing control and various steam distribution meters are also employed.

The all important feedwater treatment for the high-pressure steam generators is consummated by a Cochrane hot, lime and soda, process softener operated in conjunction with a Cochrane deaerating heater. The makeup water contains slightly more than 11 grains hardness per gallon, as shown in the following tabulation of the average findings from adjacent wells one and two:

HARDNESS OF MAKEUP WATER SUPPLIES

	Grains per U. S. Gallon	
	Well No. 1	Well No. 2
Calcium carbonate	7.18	6.95
Calcium sulphate	1.05	0.88
Magnesium carbonate	1.34	1.46
Magnesium chloride	1.52	1.23
Silica	0.88	1.05
Iron oxide and alumina	0.18	0.18
Sodium chloride	2.68	3.04
Volatile and organic	2.68	2.28

Cochrane Corporation.

The lime precipitates the high carbonate contents of calcium and magnesium, leaving only a trace of residual hardness, which small amount is precipitated by a supplementary phosphate treatment—precipitated without causing the sludge to settle rapidly or adhere to the evaporating surfaces.

The softener operates under a pressure of 5 pounds per square inch and the softened water is then passed through anthracite, nonsiliceous in character, beds of two vertical filters furnished with apparatus for agitating the filter bed when necessary with steam. This softening and filtration of precipitate process rids the water of all but approximately 0.2 cubic centimeters of free oxygen per liter.

Completion of the deaeration of the softened makeup water and full deaeration of the condensate from the plant turbine are consummated in a Cochrane down-flow type deaerator, the condensate being introduced directly into the deaerator and sufficient softened makeup water added to meet the steam generator requirements. The temperature of the feedwater is raised in so doing, corresponding to 25 pounds per square inch pressure, the softened makeup, inci-

dentally, having to be pumped to the deaerator against this head.

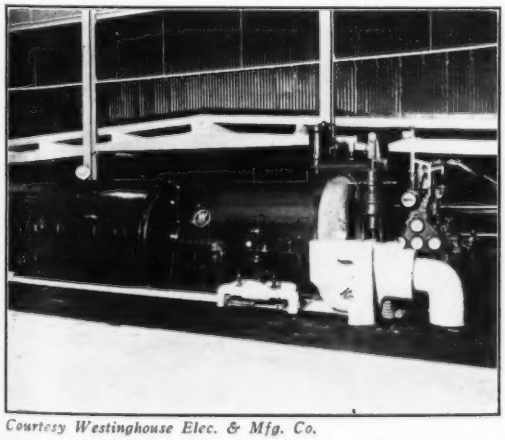
The deaerator is not provided with a conventional vent condenser, a control valve regulating the flow of vented steam removed from the deaerator by bleeding, instead to a 5-pound line, from which the steam for the softener is taken so far as possible. When this 5-pound steam supply is insufficient, the deficiency is made up from a 25-pound steam line, the pressure at which the mill turbine is bled.

Power Generation and Distribution

The power generating, electrical distribution and motor and control equipment of the plant is designed to handle a motor installation of approximately 4,000 motor horsepower, the prime mover, or main power generating equipment, consisting of a 3,000 Kilowatt (3,750 kva at 80 per cent power factor) Westinghouse automatic single bleeder condensing turbine designed to operate on 590-pound steam with 225 degree F. superheat at the throttle. This turbine, which is directly connected to and drives the plant's 3-phase, 60 cycle, 2,400 volt Westinghouse generator, equipped with exciter and generator air cooler, is bled at 50 pounds gauge and exhausts at 28-inch vacuum to a 1,000 square foot surface condenser.

Electric distribution throughout the plant is at both 2,400 volt potential for the motors of 60 horsepower capacity and more and at 440 volts for the smaller motors, the lower voltage being secured through a power transformer bank. The switchgear is also of Westinghouse design and consists of an eleven panel, cubicle type, switchboard made up of seven 2,400 volt panels, controlling the turbo-generator, power transformer bank and five power feeders, and four 440 volt panels, controlling six 440 volt feeders. A detail of interest is that the 2,400 volt motors are each controlled by a cubicle type reduced voltage starter, while each of the low voltage motors is controlled by a combination line-starter and deion circuit breaker.

The turbo-generator, primary distributing switchgear transformer bank and most of the 2,200 volt motor control cubicles are housed in the turbine room, the switchgear consisting of generator voltage regulator, totalizing graphic instruments, six 2,300 volt and six 460 volt circuit equipments and a battery



Courtesy Westinghouse Elec. & Mfg. Co.

3000 KW. AUTOMATIC SINGLE BLEEDER CONDENSING WESTINGHOUSE TURBINE DESIGNED TO OPERATE AT 590 LB. STEAM WITH 225°F. SUPERHEAT AT THROTTLE.

Courtesy Westinghouse Elec. & Mfg. Co.

440 VOLT WESTINGHOUSE MOTOR CONTROL CUBICLES.

charging panel of the metal-clad type. The 2,300 volt circuit breakers are electrically controlled, while the 460 volt circuits have manually operated air breakers.

The instruments and control switches are mounted on the front doors of the respective cubicle units for the high-voltage section and a common meter panel is provided for all 440 volt circuits. The entire switchgear thus forms a continuous compact unit, accessible from front and rear, and is placed alongside the turbo-generator, so that one operator can supervise the assemblage. The transformer bank for the 440 volt section is located in the basement directly under the switchboard.

The mill motors at either voltage, all of which are equipped with anti-friction bearings, are grouped by departments on the various feeders. This arrangement is to give suitable loads for the several mill sub-divisions and to permit localization of electrical trouble by shutting off only the section, or division, affected.

Control current for the 2,300 volt switchgear is obtained from a 125 volt control battery housed in the room with truck battery charging equipment. This control battery has considerable excess capacity and can be used for a short period for emergency lighting in case of accidental power failure, automatic transfer switching being provided for this purpose. During longer periods and when the mill is shut down, power for lighting and miscellaneous services is furnished by the local municipal power company.

There are in the plant at present some hundred and fifty motors totalling in the aggregate about 3,500 horsepower capacity, the majority of which are of the splash, drip-proof, squirrel cage type with some totally enclosed fan-cooled motors in the more difficult locations. There are also twenty-eight gear-motors on the conveyor systems.

Motors in excess of 150-horsepower capacity are started on reduced voltage, while the motors up to and including 150-horsepower capacity are started at full voltage. The 220-volt starters are assembled in steel cubicles, being combination deion motor starters with no-fuse circuit switch and built-in test jacks, all mounted in the common enclosure.

As a protection against drips and splash, motors for outdoor mounting and where such protection is deemed necessary are provided with splashproof cov-

ers and their controls are housed in water-tight cases. Totally enclosed motors are used in all dusty locations.

How these many motors are used, their functions, and a kind of sketchy running inventory of the main equipment in service at the Container plant follows:

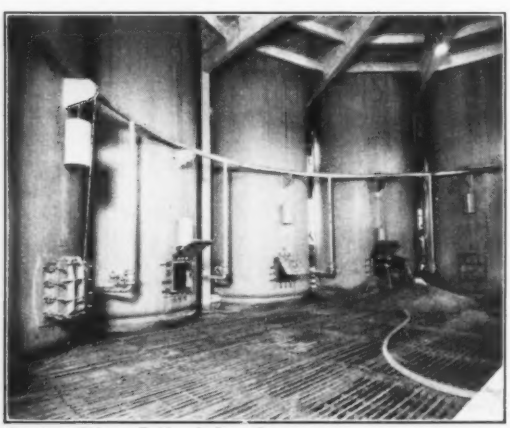
Wood Yard—Chip House

Starting at the wood yard, then, the conveyor system for handling the pulpwood, chips and bark includes almost half a mile of Jeffrey conveyors in ten lines. There are two yard conveyors, one following the other, leading to the barking drum, 402 and 202 feet in length capable of carrying 30 cords of pulp logs per hour. Feeding these two conveyors are a yard storage conveyor 401 feet in length and a barge unloader conveyor of 63½ feet, the latter having an hourly capacity of 25 cords.

From the Manitowoc barking drum, a 266 foot, 30 cord per hour, conveyor takes the cleaned pulp logs to the wood room and a succession of conveyors takes the bark and rejects to the boiler house. These four conveyors of 3 cords of bark per hour capacity are, starting from the barking drum, 60½, 290, 275 and 143 feet in length. A chip belt, 445 feet in length, conveys 8,010 cubic feet of chips per hour from the wood room, where the chipper is installed, to the digester building.

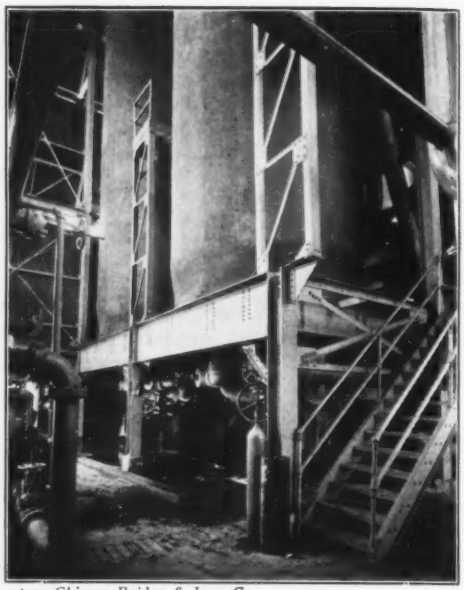
For the handling of pulp logs into and out of storage, to and from the conveyors and in unloading barges, a powerful 30-ton Ohio, Diesel driven, crane of the standard railroad type is employed. This locomotive crane is furnished with an efficient pulp log handling grapple and greatly expedites the movement of the wood in storage, reclamation and delivery to the chipper.

The chipper, ruggedly built by the Carthage Machine Company, is an 88-inch unit directly connected to a powerful Electrical Machinery Mfg. Company synchronous driving motor and possesses some excellent features. For instance, the chipper disc has easily renewable, wear resistant, plates covering the entire working surface, which materially reduce upkeep expense. Another refinement is the use of safety rings which protrude the same distance as the chipper knives and, consequently, preclude danger of knife clashing and provide a convenient gauge for setting the knives symmetrically and with close clearance between the disc and bed knives, thus virtually eliminating slivers and ribbons in the chipper output.



Courtesy Chicago Bridge & Iron Co.

FIVE OF THE SIX DIFFUSER TANKS, EACH OF 4,600 CU. FT. CAPACITY.



Courtesy Chicago Bridge & Iron Co.

TWO 12 FT. DIAMETER BY 45 FT. HIGH DIGESTERS FOR 150 LBS. PER SQUARE INCH WORKING PRESSURE.

The chip screen equipment, supplied by The Orville Simpson Company, consists of a large Rotex chip screener, with a top surface of 5 feet by 12 feet 8 inches and lower screen surface of 5 feet by 12 feet, and a smaller Rotex chip screener, with a top screen surface of 40 inches by 5 feet 2 inches and lower screen surface measuring 40 inches by 6 feet 4 inches. The larger machine has a capacity of from 15 to 18 cords of chipped wood per hour and takes the wood as it is delivered by the chipper, while the small machine has a capacity of from 4 to 5 cords of chipped wood per hour and simply screens the over-size chips from the large screen after such rejects have been put through the breaker, or rechipper.

Digester Building and Diffuser Room

From the chip bin, the prepared chips and the added liquor and chemicals pass to two large, 12 foot diameter by 45 feet high, digesters built by the Chicago Bridge and Iron Company, which have been X-rayed and stress relieved for operation at 150 pound per square inch pressure. The shells of these massive digesters are 1 11/32 inches in thickness, with the top hands and bottom cones 1 5/16 inches thick.

These two 4,300 cubic foot capacity digesters are equipped with F.M.P. (Fibre Making Processes) circulating system by which the liquor is withdrawn through a circular strainer located at the middle and pumped back to the bottom and top of the digester, the steam being supplied to the digester through bottom nozzles. The cooked pulp from the digesters then passes to a rugged, butt-welded cyclone, built by the Chicago Bridge and Iron Company, on the roof of the diffuser room, the released steam passing through a Rosenblad blow-steam condenser plant.

The blow steam is condensed in a specially designed jet condenser, from which the contaminated hot water goes to an accumulator. From the top of this ac-

cumulator, the hot water is pumped through two Rosenblad spiral heat exchangers, where clean cold water is heated by the contaminated condensate for washing purposes, the cooled down condensate going back to the bottom of the accumulator and from there pumped to the jet condenser for condensing the blow steam. The flow of cooled condensate to the jet condenser is regulated automatically so as to keep the temperature of the hot condensate from the jet condenser constant.

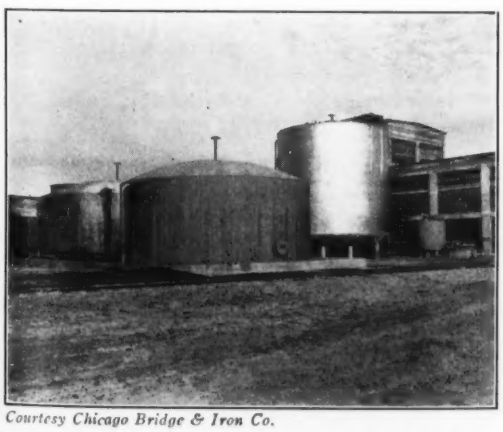
Recovery of Chemicals

The cooked pulp, on leaving the cyclone, passes, through a swivel pipe, or spout, to one or another of six large, 14 foot 6 inch diameter by 33 feet 4 inch high of 4,600 cubic feet capacity, diffusers—Chicago Bridge and Iron Company units—where the liquor is washed from the pulp and the weak black liquor efflux goes to the Swenson evaporator. This latter unit, a five body affair, raises the concentration of the black liquor from about 17 per cent solids to 55 per cent strong black liquor, which is then placed in an 11 foot diameter by 20 foot high black liquor, butt-welded storage tank.

A round Leeds and Northrup conductivity recorder continuously registers the purity of the condensate from the evaporator and gives instant warning of any contamination. That is, upon leakage of any black liquor into the condensate a Micromax sounds an alarm, signalling to the operator to open a valve and divert the impure condensate to waste.

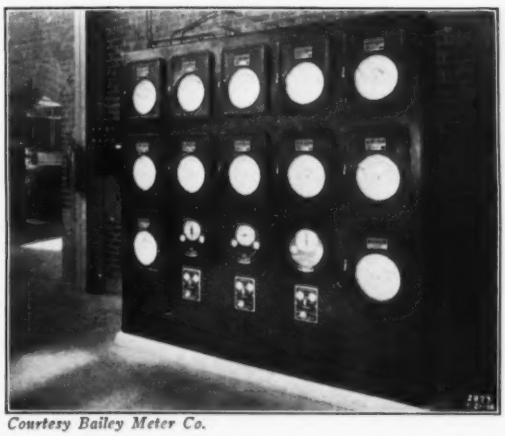
One of the most interesting operations is the handling of the salt cake, by means of dustless and compact Redler conveyor-elevators. These carriers require no deep loading pit, run equally well horizontally, vertically or at an incline, and are low in first cost and economical in operation, consuming little power and being exceptionally free from upkeep troubles and expenses.

There are two of these conveyor-elevators at the Container plant, one a 5-inch, L-type, assemblage and the other an 11-inch run-around carrier. The latter Redler runs 117 feet horizontally and 22 feet vertically in storing and reclaiming the salt cake delivered at the plant by trucks. The salt cake is dumped into a loading hopper from which it is raised by the Redler and discharged over a long storage area through hinged gates spaced every five feet on the upper run of the carrier, at a rate of 60 tons per hour. The



Courtesy Chicago Bridge & Iron Co.

TO THE LEFT, BLACK LIQUOR STORAGE TANKS 33 FEET IN DIAMETER BY 13 FEET, 6 INCHES IN HEIGHT.



Courtesy Bailey Meter Co.

DISTRIBUTION METER, PRESSURE REDUCING AND DESUPERHEATING CONTROL PANEL

stored salt cake is reclaimed by lifting floor boards and allowing the material to sift through floor gratings into the lower, return run of the carrier.

The reclamation of the stored, run-of-mine salt cake is consummated at a rate of 8½ or 9 tons per hour and the material reclaimed from storage is carried by the Redler to a Williams hammermill crusher by which the salt cake is crushed, 95 per cent passing a No. 8 screen with no pieces larger than 3/16 inch. This fine discharge from the crusher is then taken by the 5-inch Redler, carried 7 feet horizontally and then 77 feet up a steep incline to a small gravity storage hopper, from which it is drawn as required for mixture with the strong black liquor fed to the recovery unit.

The black liquor and salt cake mixture is then sprayed into the furnace of the recovery unit, as described in the account of the Chesapeake-Camp Corporation plant, and the melted black ash from the recovery unit passes onto the causticizing plant where the reclamation of green liquor is effected by the continuous Dorr causticizing system, similar to that discussed briefly in the account of the Brunswick Pulp and Paper Company installation.

The essential equipment, in the line of carrier and storage units, for this highly effective system causticizing consists of a bin for fresh lime; a bucket elevator for elevating fresh lime to storage bin; and lime feeder and screw conveyor to discharge new lime from bin to slaker. In the line of machinery units, there are the Kilby rotary slaker; Dorr bowl classifier; Dorr turbo-causticizers; Dorr continuous clarifying thickeners for white liquor; and a double pass green liquor heater.

Among the accessory equipment may be mentioned the two Gould corrosion resistant, 3-inch centrifugal pumps for handling 100 gallons per minute of green liquor of 1.2 specific gravity at 200 degrees F. against a 25 foot head; the Bailey Meter Company liquid level recorders for black, green and white liquor; and the comprehensive complement of instruments provided for the system. The latter include a Foxboro Stabilog temperature recorder controller on the green liquor from the east exchanger; a Foxboro recording thermometer on the causticized liquor to the strong liquor thickener; a similar instrument on the wash water to the weak liquor thickener; a Foxboro recording flow meter on the same line; and a recording

Stabilog flow controller on the raw green liquor to the clarifier.

Screen Room Equipment

The stock, pumped from the diffuser chest, passes to a head box in advance of the knotters through a continuously circulating system in which is a Precision Consistency Regulator (Paper and Industrial Appliances, Inc). This mechanism reacts on the free stock to govern accurately the density of the stock fed to the knotters and is reported to hold variations in stock consistency within 1/10th of 1 per cent.

Next, the stock goes through the three Impco (Improved Paper Machinery Corporation) knotters located on the second mezzanine floor of the screen room, each furnished with its individual head box and driven through an integrally built worm reduction unit by a direct connected motor. From these knotters, the stock drops directly to four Impco centrifugal screens having 1/8-inch perforations and then flows by gravity to two Impco 8-foot by 8-foot high vat vacuum deckers.

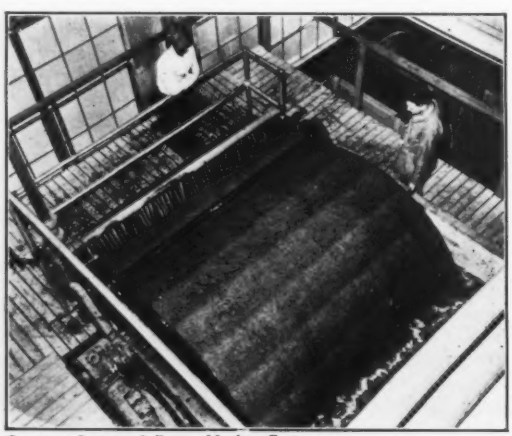
These deckers act both as deckers and as savealls, the excess white water from the pulp drying machine being returned and mixed with the stock just ahead of the deckers. The effectiveness of this conservation practice is evidenced by the fact that the effluent loss is being held well below 1/4 pound per thousand gallons. An Impco rotary slusher for thickening the screen tailings ahead of the refiner also serves to hold down expenses.

Still other devices tending to cut down production costs, improve quality of pulp produced and maintain high operating efficiency are several Dilts units—namely, a "hydrafiner" used in the treatment of the screenings for the pulp mill and the two propeller agitator drives used in conjunction with the stock chests of the mill.

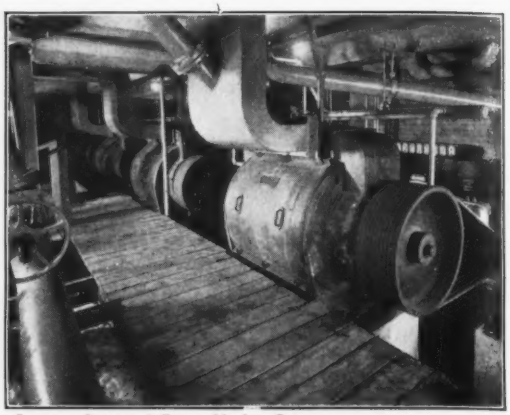
Machine Room

Enveloped by its great hood, the Beloit 136-inch Fourdrinier, especially designed for pulp, is outstanding—a vertical machine of advanced design, possessing many features of especial interest. Briefly, some of these follow:

The breast, table and wire rolls are all equipped with heavy duty anti-friction bearings, as are all of the other main rotating members of the machine, the cantilever suction couch roll, press and felt rolls, sectional drives, etc. The lineshaft overhead, likewise, is supported in anti-friction pillow blocks.



Courtesy Improved Paper Machy. Corp.
CLOSE-UP OF 8 x 8 FOOT VACUUM DECKER.



Courtesy Improved Paper Machy. Corp.
INDIVIDUALLY DRIVEN, CENTRIFUGAL KNOTTER SCREENS.

The suction couch roll is arranged with a balanced, floating packing arrangement on a wide internal suction box, thus permitting the use of two pressure rolls against the couch. The suction connection is made through a large hollow section of the front supporting stand, which stand has a removable section for convenience in installing new wires.

The first press consists of a rubber covered press having a front suction connection with a gun metal covered top roll. The second press, of plain rubber covered and gun metal covered rolls, while the third press is a heavy duty one having large diameter rubber and gun metal covered rolls arranged for extremely high nip pressures.

The drier section of 48-inch driers, arranged in stock frames and supported in enclosed bearings, is provided with a completely automatic lubricating and filtering system. The driers have machine cut gears and oilless, balanced steam joints and a rope carrier is arranged to take the pulp through the driers. The drier section also has an ingenious arrangement of footwalks and ladders to provide easy access to the top of the drier section.

The extra heavy duty cutter with which the machine is furnished is provided with a duplex slitter arrangement, enabling the operators to change from one set of slitters to the other without breaking down the sheet or arresting production. The cutter is also provided with a special sheet handling device to support the sheet while the piles of cut sheets are removed.

The sectional machine drives are heavy duty spiral bevel gear transmissions operating in a bath of oil, so that the special steel cut gears are automatically lubricated even at low speeds. Flexible couplings connect the indriving shafts to the various sections of the machine and the clutches on the drives are of the automotive mechanical type having air-cooled friction plates and a simple, positive adjustment for taking up wear in the friction lining.

Machine Hood and Ventilating System

The machine is provided with a Ross removable, panel type, hood, separated into four independent sections, each of which is set up between the trusses

and terminates in a stack with an individual fan for each section. These fans are of the ventilator type, set vertically, and are motor driven by V-belts.

The air is supplied from two sources; one being a central Buffalo Forge Company fan which distributes the air over the roof to prevent condensation; and the other, two similar fans which supply air to the machine, by means of the hollow frames and also by heavy steel pipe cross nozzles, steel pipe being used to guard against damage to the nozzles in case of breaks on the machine. So far, this method of forced air ventilation has been installed in only two mills in this country, although it has been used to some extent abroad.

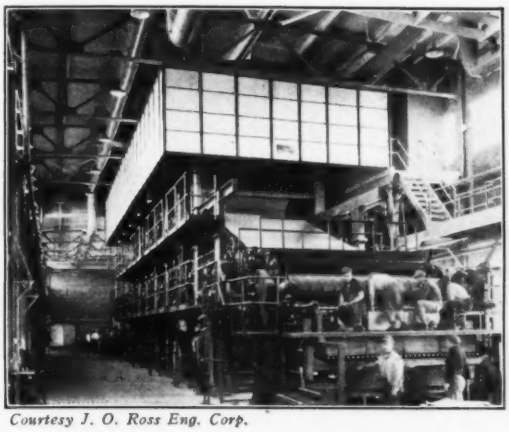
The roof system Buffalo fan, incidentally, operates over a range of 12,700 to 19,880 cubic feet of air per minute, at 650 revolutions per minute. At the same speed the other two Buffalo fans each deliver from 10,130 to 15,880 cubic feet of air per minute.

Other details of special interest in connection with the operation of the pulp machine is the use of a Brooke Engineering Company pressure regulator on the steam supply to the drier section, the function of which is to hold substantially constant the reduced pressure at which the steam enters the drier rolls; the large 600-ton Baldwin-Southwark press for compressing the bales of pulp sheets; and the J-B Engineering baled pulp grab.

This grab hook is suspended from a single trolley beam and stacks the bales of pulp four high for subsequent removal by truck, picking-up the bales as they come off the delivery conveyor from the machine and trollies them out to the stacking platform.

The Ingersoll-Rand air compressor and the special pumps furnished by that company are likewise typical of the care exercised at the Container plant in the selection of its equipment, as are the S. F. Bowser oiling system; Strong, Carlisle & Hammond steam traps; the many Crane, Consolidated-Ashcroft, Edwards, Lunkenheimer, Walworth and Jenkins valves, including numerous Jenkins standard disc type valves and Jenkins "regrind-renew" globe valves and in the angle type used for 200 pound steam pressure.

The construction of the 3,500 gallon per minute, 24-inch well sunk by the Layne-Atlantic Company is likewise an example of the high-class work on the part of the sub-contractors. This well is cored out of the hard silicified sand and limestone to the firm



Courtesy J. O. Ross Eng. Corp.

136 INCH BELOIT PULP FOURDRINIER WITH ROSS REMOVABLE, PANEL-TYPE HOOD.

Ocala rock, close to 550 feet below ground surface, and cemented, a continuous string of 24-inch, inside diameter, ½-inch thick, wrought-iron welded pipe being set and cemented in place. The well is provided with a Layne high-efficiency turbine pump.

Noteworthy Undertaking

The work of the other sub-contractors and the quality of the equipment installed are in general of like high-order, making this first of the new mills in production at Fernandina a truly noteworthy accomplishment and the appended list of sub-contractors and principal equipment manufacturers a directory a record of value.

The Officers of the Company

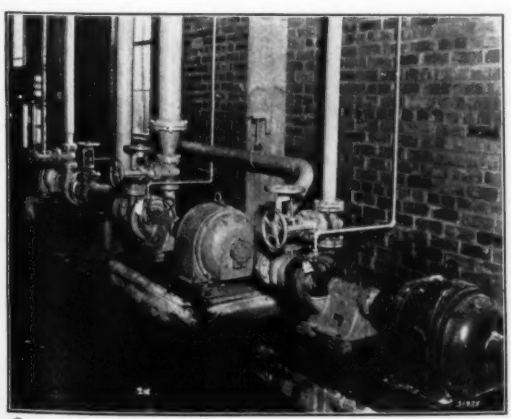
The officers of the company are as follows:

Walter P. Paepcke, president; J. J. Brossard, vice-president in charge of production; W. M. Dixon, vice-president in charge of sales; H. C. Baumgartner, treasurer and comptroller; C. Madsen, assistant-treasurer; E. A. Wagonseller, secretary, L. A. Combs, assistant-secretary; C. R. Hunsicker, plant manager.

George F. Hardy, New York, designing engineer.

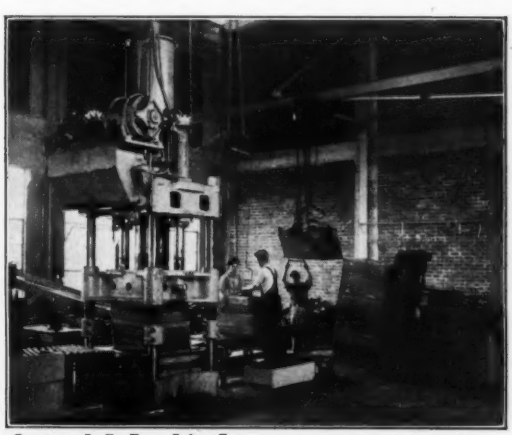
Merritt, Chapman & Scott Corporation, New York, general contractor.

The list of Sub-Contractors and Manufacturers of the Principal Equipment in the new mill follows:



Courtesy Ingersoll-Rand Co.

3 CRV BLACK LIQUOR PUMPS.



Courtesy J. B. Eng. Sales Co.

GRAB HANDLING PRESSED PULP BALES.

Sub-Contractors and Manufacturers of the Principal Equipment

Boilers, power and recovery	The Babcock & Wilcox Co.
Bark burning furnace	The M. A. Hofft Co.
Furnace arches	Laclede-Christy Clay Products Co.
Soot blowers, gauge classes	Diamond Power Specialty Co.
Fuel tank heaters	Griscom-Russell Co.
Combustion control, meters	Bailey Meter Co.
Feedwater treatment, continuous blow-down	Cochrane Corp.
Turbo-generator, switchgear, elec. equipment	Westinghouse Electric & Mfg. Co.
Miscellaneous motors, transfomers, etc.	General Electric Co.
Air compressor, pumps	Ingersoll-Rand Co.
Conveyors—woods, bark, chip	Jeffrey Manufacturing Co.
Barking drum	Manitowoc Engineering Co.
Chipper	Carthage Machine Co.
Chip bin gates, chutes	Jeffrey Manufacturing Co.
Chip screen equipment	Orville Simpson Co.
Digesters	Chicago Bridge & Iron Co.
Black liquor circulating system	Fibre Making Processes, Inc.
Cyclone	Chicago Bridge & Iron Co.
Rosenblad condenser plant	Fibre Making Processes, Inc.
Diffusers, spiral spout	Chicago Bridge & Iron Co.
Evaporators, five body	Swenson Evaporator Co.
Tanks	Chicago Bridge & Iron Co.
Salt cake Redler conveyor	Stephens-Adamson Mfg. Co.
Crusher—salt cake	Williams Patent Crusher Co.
Salt cake feeder	Jeffrey Mfg. Co.
Causticizing equipment	The Dorr Co., Inc.
Pumps	Gould Pumps, Inc.
Liquid level recorders	Bailey Meter Co.
Instruments	The Foxboro Co.
Consistency regulators	Paper and Industrial Appliances
Knotters, screens, thickeners	Improved Paper Machinery Corp.
Refining engine, chest agitators	Dilts Machine Works, Inc.
Pulp conveyor	Brady Conveyors Co.
Tanks	Graver Tank & Mfg. Co.
Pulp machine	Beloit Iron Works
Machine condensate system	Midwest Fulton Co.
Ventilation, machine hood	J. O. Ross Engineering Corp.
Fans	Buffalo Blower Co.
Pressure regulator	Brooke Engineering Co.
Air conditioning equipment	J. O. Ross Engineering Corp.
Pulp baling press	Baldwin-Southwark Corp.
Baled pulp grab	J. B. Engineering Co.
Oiling system	S. F. Bowser & Co., Inc.
Leather belting	Alexander Bros.
Cord belts	B. F. Goodrich Co.
Insulation	Johns-Manville Corp.
Blowers and fans	B. F. Sturtevant Co.
Rubber belting, fire hose	U. S. Rubber Co.
Hoists	Yale & Towne Co.
Cranes	Reading Chain & Block Co.
Tank—sprinkler	Chicago Bridge & Iron Co.
Sprinkler system	The Viking Co.
Synchronous motor for chipper	Electrical Machinery Mfg. Co.
Roofing materials, insulation	Philip Carey Co.
Structural steel	Jones & Laughlin Steel Co.
Brick, tile	Standard Brick & Tile Co.
Roofing materials	The Walker Jamar Co.
Pumps	Gould Pumps, Inc. Ingersoll-Rand Co. La Bour Company, Inc. Layne-Atlantic Co. LeBlanc Company Westco Pump Co. Worthington Pump & Machinery Corp.
Valves	Consolidated Ashcroft-Hancock Co. Crane Co. Edwards Valve Co. Jenkins Brothers Valve Co. Lunkenheimer Co. The Walworth Co.
Electric trucks	Auto Transportation Co.
Storage battery	K. W. Battery Co.
Couplings	Falk Engineering Works
Scales	Fairbanks Morse Co.
Steel lockers	Berger Manufacturing Co.
Chimney	H. W. Kellogg Co.
Chimney breeching	Levinson Co.
Crane—Diesel track	Ohio Locomotive Co.
Crane grab for wood	J. F. Kiesler Co.
Roof slabs	Federal American Cement Tile Co.
Conductivity recorder, Micromax	Leeds & Northrup Co.

Another Step in Southern Development

Announcement of the 99-year land lease at Mobile for a $5,000,000 white paper plant signifies the beginning of a new and great industry in the Deep South and an important addition to the agricultural-industrial meshwork needed to strengthen the Southern economy, says the *Times-Picayune*, of New Orleans, La.

The work of the man who made the new industry possible, Dr. Charles A. Herty, typifies the scientific effort and engineering the South will require to make its program effective. Southern pine has been the hobby of Dr. Herty for more than a quarter-century and 10 years have elapsed since he began specifically the difficult and at times highly discouraging task of showing the country where to turn for its supply of white paper and newsprint. He proved that the pine sapling would pulp properly in the sulphite process, as distinguished from the alkali used in making brown paper, and by so doing has saved the country from a serious newsprint famine. American presses have eaten away, at the rate of tens of thousands of acres a year, the Canadian spruce, which takes some 50 years to grow. Growing in 12 to 15 years, the pine from cultivated and protected "plantations" will meet the larger part of the demand in the future.

With the coming of this and other kinds of industry, the South will find that it also has acquired new responsibilities. Its program will need careful guidance to make the wealth lasting, preserve industrial peace and good will, and prevent the evils of exploitation. By planning a sound industrial policy and by avoiding too much concentration, we should profit by the experiences of other industrial areas without inheriting too many of their weaknesses.

Bowen Fibre Products Co. Starts

STEVENSON, Wash., April 23, 1938—The Bowen Fibre Products Company, new industry in the Bonneville dam area, has began operations here.

A. D. Bowen, manager of the new factor, and founder of the Pacific Coast Paper Mills of Bellingham, Wash., announced the beginning of production in the new factory, just west of Stevenson. J. D. McKee of Stevenson is plant foreman.

RECORD FOUNDRY & MACHINE CO.
LIVERMORE FALLS, MAINE, U. S. A.
Manufacturers for (36) years of
"RECORD SPECIALIZED STOCK VALVES"

"RECORD BONNETLESS ALWAYS SAVE PROCESS TIME" BECAUSE

(1) No bonnets to plug up means 100% pipe capacity, — valve open.
(2) Valve part open, — gate is supported against chatter, and consequent cutting away of seats.
(3) Racks or screw stems always in sight indicates predetermined gateage.
(4) Gate always locked in place.

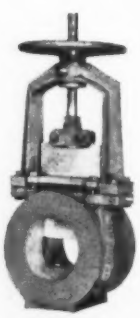


FIG. 241

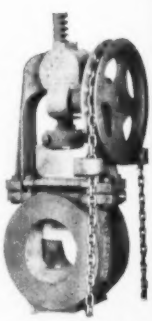


FIG. 242

Above the new Record "RESIDUE POCKETLESS" pulp stock valves.

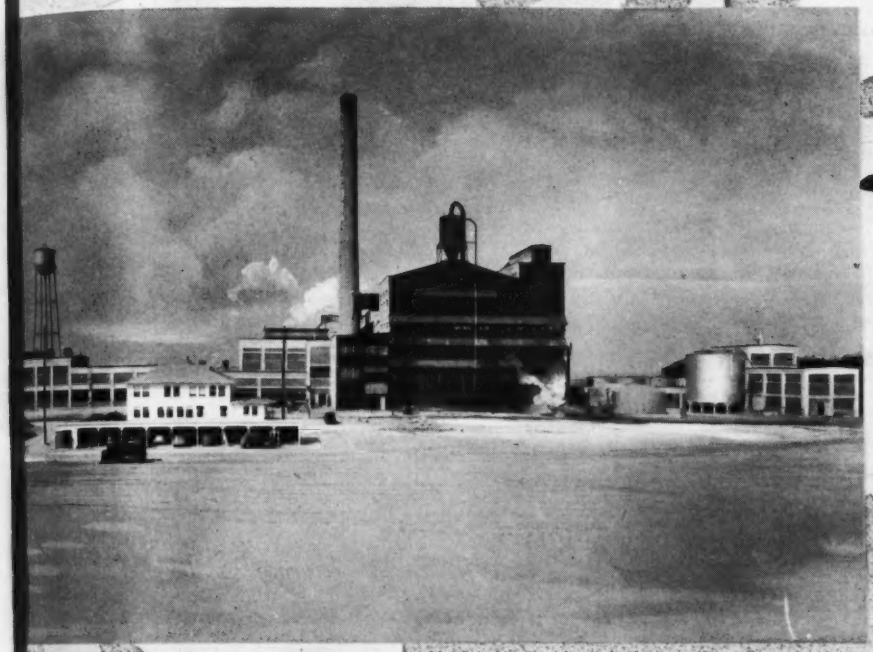
(a) No point in lower run thru valve below lower inside of outlets hence full gate seating.

(b) Gate wedge seated, valve closed assures stock tightness,—valve subjected to reverse pressure.

(c) Shearing and scoop edges (2) cut long fibre and clear gate chambers.

Valves furnished Record short or standard lengths face to face and in sizes to 48".

IT IS 60 YEARS SINCE THE BLACK HORSE CAME ASHORE



TO BUILD FOR INDUSTRY

For seventy-eight years, the BLACK HORSE of the SEA on the house flag of Merritt-Chapman & Scott Corporation has been a symbol associated with marine salvage and floating derrick operations—a service brilliant with the romance of achievement. Less well-known to the public perhaps, but only because less spectacular, is the record of sixty years of engineering construction for Commerce and Industry. From the standpoint of achievement, the Engineering Construction Division has earned a record comparable to that of the Salvage and Derrick Division—even exceeding it in volume and variety, as evidenced by more than 2900 completed projects, totaling hundreds of millions of dollars. These have included pulp and paper mills, oil refineries, steel mills, industrial buildings, bridges, tunnels, docks, breakwaters and many unusual and difficult types of construction.

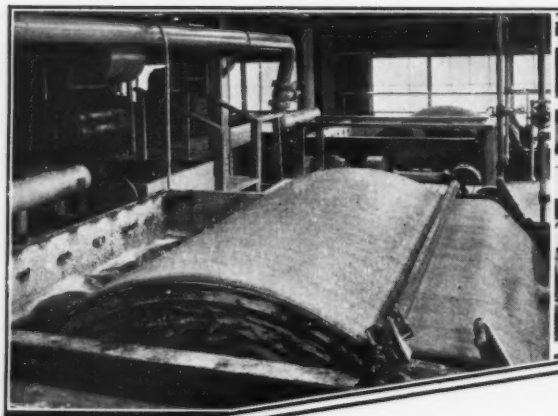
This remarkable record is the result of the resourcefulness and experience of a personnel picked from a variety of specialized fields, welded into one inclusive operating unit. The services of this same organization—geared to speed and economy in construction, supplemented by equipment facilities far beyond the usual and backed by financial capacity—are offered to prospective clients.

Above, plant recently completed at Fernandina, Fla., for Container Corporation of America.

For those interested, we have available a comprehensive and illustrated record of our activities.

ENGINEERING CONSTRUCTION DIVISION

MERRITT-CHAPMAN & SCOTT CORPORATION



Upper: View of "Impco" equipment installed for Kraft Corporation at Fernandina, Fla.

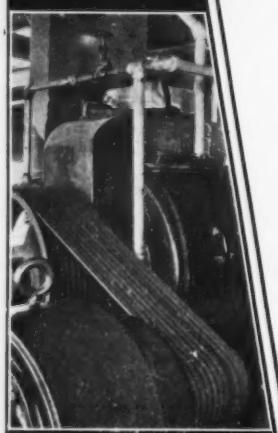
Upper: "Impco" Equipment in Chesapeake-Camp Corp. mill.

On the Job

with

IMPCO

In every section of the industry you find "IMPCO" equipment on the job to make certain maximum output, cleaner stock, less waste and minimum power and maintenance costs. The "IMPCO" mark on Screens, Filters, Knotters, Washers, Deckers, Thickeners and Wet Machines, etc., has become a familiar symbol for superior performance in mills.



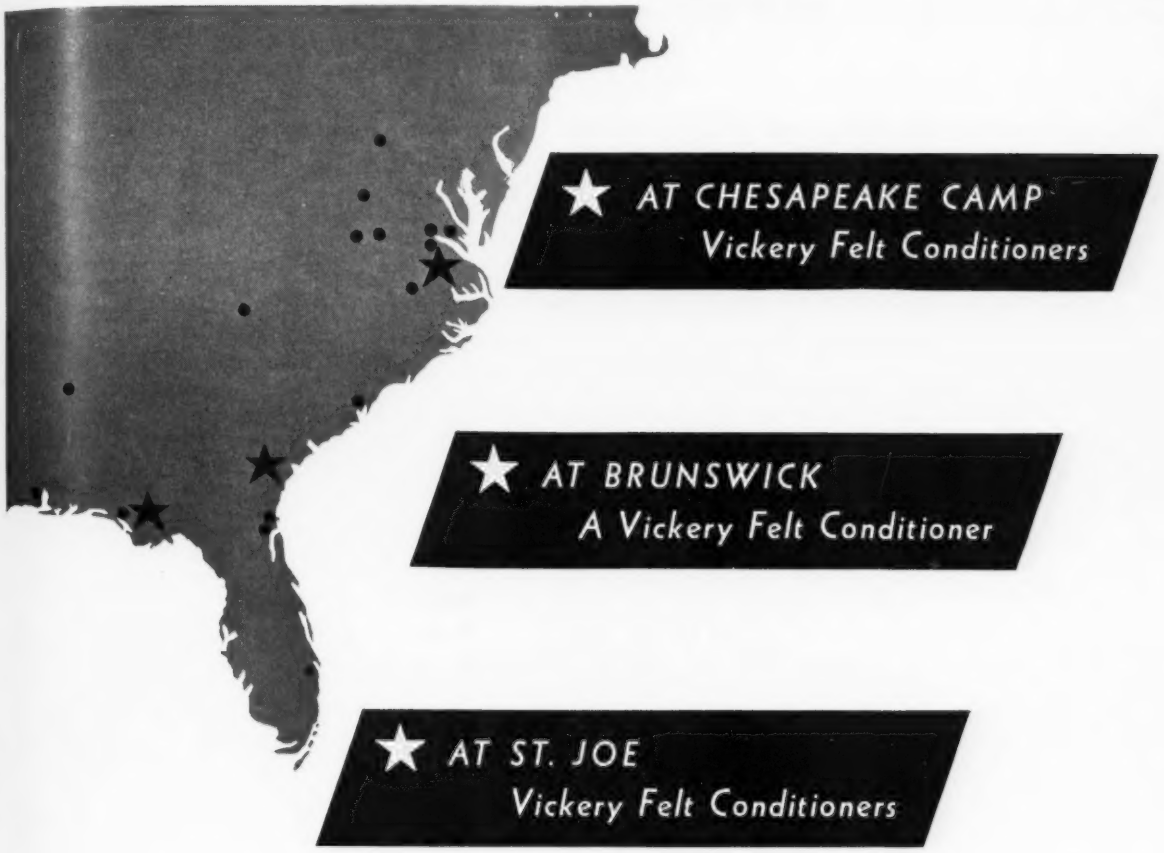
A few of the Centrifugal Screens furnished for a large new mill.

Virtually all Pulp Mills use "IMPCO" Knotters.

Above: "Impco" Flat Screens—24 recently installed in Brunswick Pulp & Paper Co.

IMPROVED PAPER MACHINERY CORPORATION

Nashua, New Hampshire



South, North, East and West the operating advantages and savings resulting from 100% clean, uniform press felts have become so well known and appreciated that the Vickery Felt Conditioner is standard equipment in virtually every up-to-date machine room. . . . If there is a single press felt in your mill that's still permitted to go unconditioned and to fill up until you have to shut down and give it a wash, why not put a Vickery Felt Conditioner to work at once. If it doesn't pay for itself in short order we'll take it back and not charge you a penny. . . . Could anything be fairer than that?

● *Dots represent other Vickery Felt Conditioner installations in this area — nearly a score of mills averaging over 3 Conditioners apiece.*

BIRD MACHINE COMPANY
SOUTH WALPOLE, MASS.

VICKERY FELT CONDITIONER

KNOW YOUR ROLL COSTS

When you have *facts* and *figures* to prove which rolls last longest, give the best results at the lowest cost, you can't be deceived by exaggerated claims and statements.

Start now to keep a brief record of rubber roll specifications, grindings and total service life. You will soon know which rolls are best for your mill in terms of *cost per ton of paper produced.*

To help you make this conclusive test of rubber roll performance, we will furnish free a supply of Record Books in which the facts can be quickly entered and kept in compact, permanent form. We will gladly let our claims for Stowe-Woodward superiority rest on the results of *your* experience in *your* mill.

STOWE-WOODWARD, INC.
NEWTON UPPER FALLS, MASS.
NEW YORK OFFICE · WOOLWORTH BLDG.

THIS WILL HELP YOU

STOWE-WOODWARD, INC.
OAK STREET
NEWTON UPPER FALLS, MASS.

Gentlemen:

Please send us without charge or obligation..... copies of the Roll Service Record Books which make it easy to keep an accurate record of rubber roll performance in our mill.

NAME_____

TITLE_____

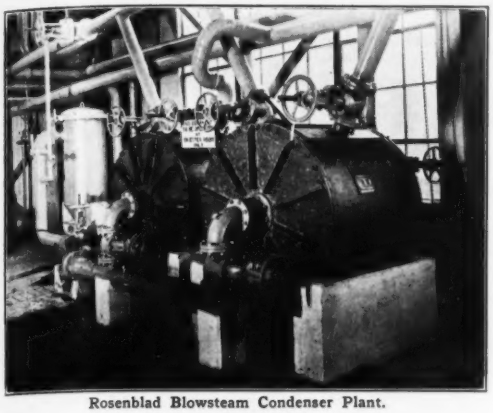
COMPANY_____

ADDRESS_____

Makers of WHITE STAR *Rubber Covered Rolls,* TANNITE *Couch Rolls* STONITE *Top Press and Smoothing Rolls—All by the* COREWELD *Process*

Stowe-Woodward Rolls are made on the West Coast by HUNTING TON RUBBER MILLS, INC., *35 W. Lander St., Seattle, Wash.*

F. M. P. EQUIPMENT IN THESE MILLS



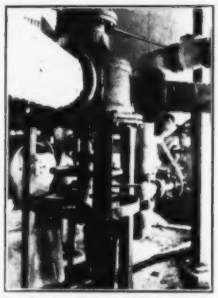
Rosenblad Blowsteam Condenser Plant.

St. Joe Paper Co., Port St. Joe, Fla.

2—12′ x 45′ U-Bar Chain Suspended Barking Drums.

4—Circ. & Ind. Heating Systems for Digesters.

Rosenblad Blowsteam Condenser Plant.

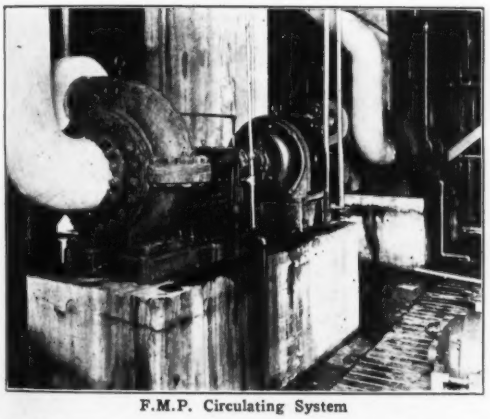


Sandberg Central Blow Valve

Brunswick Pulp & Paper Co., Brunswick, Ga.

4—Circ. & Ind. Heating Systems for Digesters.
Rosenblad Blowsteam Condenser Plant.
Rosenblad Turpentine Condenser Plant.
Sandberg Central Blow Valve.

4—Drammen Blow Valves.

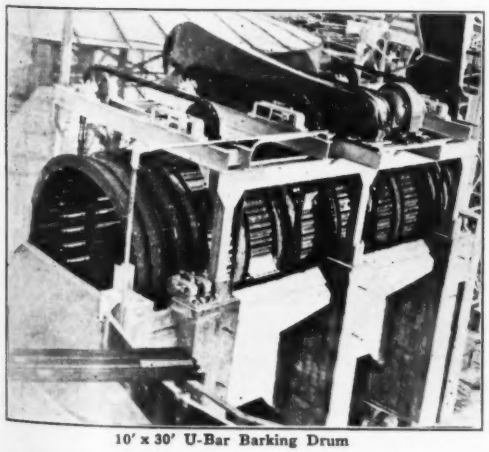


F.M.P. Circulating System

Kraft Corp. of America, Fernandina, Fla.

2—Circulating Systems for Digesters.

Rosenblad Blowsteam Condenser Plant.



10′ x 30′ U-Bar Barking Drum

Chesapeake-Camp Corp., Franklin, Va.

1—10′ x 30′ U-Bar Chain Suspended Barking Drum.

6—Sandberg Diffuser Dump Valves.

FIBRE MAKING PROCESSES, INC.
CHICAGO, ILL. U.S.A.

Studies of Pulpwood Production In Shortleaf-Loblolly Pine Stands*

By R. R. Reynolds [1]

In 1934 the Crossett Lumber Company gave the Federal Government 1,680 acres of second-growth pine and hardwood timberland 7 miles south of Crossett, Arkansas. The purpose of this gift was to establish a proving ground not only for testing the possible costs of, and returns from, various kinds of sawlog, pulpwood, and post and pile cuttings, but also to provide an area on which to determine the costs of handling timber as a crop and the returns therefrom.

Shortly after receiving the gift, the Southern Forest Experiment Station began a series of experiments on timber growing. Among these experiments was one in thinning old-field and natural second-growth pine stands for pulpwood, some of the interesting results from which I shall discuss.

In order to provide for future cuts, it is necessary to leave a good stand each time an area is cut over. We do not know, however, the exact number of trees that should be left to obtain the largest possible returns from our timberland. Should we leave 50, 100, 200, or even more trees per acre? Will greater returns be obtained by leaving the larger trees instad of the smaller ones at the time of cutting? What sized trees will yield the greatest profits if removed, and what sized trees will show the greatest increase in value if left at the time of cutting? The purpose of our experimental work is to answer some of these questions, and for this purpose we have established the following 1-acre test plots:

TEST Uo. 1. We left about 200 of the straightest, cleanest, and best trees per acre spaced as evenly as possible (average spacing 15 x 15 feet). All straight trees under 6 inches d.b.h. not interfering with the crop trees were also left. The volume of pulpwood in the reserved trees was 24.4 cords. The cut removed 239 trees, from which 12.2 cords of pulpwood were produced.

TEST No. 2. We left about 100 of the straightest, cleanest, and best trees per acre (average spacing 21 x 21 feet). Here also were left all straight and promising trees under 6 inches d.b.h. that did not interfere with crop trees. On this area we left 14.5 cords of wood per acre in reserved trees and cut 291 trees or 24.4 cords.

TEST No. 3. We left about 70 of the straightest, cleanest, and best trees per acre (average spacing 25 x 25 feet) and also the straight and clean trees under 6 inches d.b.h. The amount of material left per acre was 13.5 cords, while we cut 240 trees or 27.8 cords per acre.

TEST No. 4. We left about 40 of the best trees per acre (average spacing 33 x 33 feet), plus the straight and clean trees under 6 inches d.b.h. On this area we left 8.4 cords per acre, and cut 285 trees or 30.4 cords per acre.

TEST No. 5. We left all trees up to (and including) 7.5 inches d.b.h. with the exception of leaning trees and trees with rot. We also left one good seed tree every 50 feet. On one plot cut under this method 201 trees were left per acre and on another 67 trees per acre, amounting to 13.3 and 6.7 cords, respectively. On the first plot we cut 24.6 cords per acre and on the second 45 cords.

Although it will be some time before we know exactly the type of cutting that will yield the greatest yearly income, present results indicate that for timber stands averaging up to 10 inches in diameter, a type of cutting in which between 100 and 200 of the best trees are left per acre will prove most profitable. Unless such timber is on very poor soil, one can reasonably expect such a stand to grow each year an equivalent of one cord per acre. This means that it will be possible to go back to the same area and cut the equivalent of 5 cords of pulpwood every 5 years at least until the trees reach sawtimber size. Many of the reserved trees will develop into high-quality trees, which if cut into sawlog and piling will be worth from three to ten times the value of such trees when cut for pulpwood. It is hardly necessary to add that potential sawtimber and piling trees should not be cut for pulpwood if the greatest profit from growing timber is the aim of our timber farming.

It will be noted that our pulpwood-cutting Test No. 5 follows almost exactly the cutting rules of the American Pulpwood Association, under which pulpwood producers are now working. The only difference is that we left a good seed tree every 50 feet in order to be sure of obtaining reproduction in case most of the present stand should be destroyed by fire or wind. Under the Association cutting rules, in some cases a very good stand will be left, but in other cases practically everything will be cut. In spite of heavy cutting in the shortleaf-loblolly pine type, most areas will undoubtedly reseed to trees and eventually another crop of timber will be produced. The resulting annual income per acre, however, is likely to be low, owing to the fact that it will be many years before the trees become of merchantable size. The costs per acre, on the other hand, will be the same as for areas containing high-quality growing stock.

The pulpmills in this country will require many years to depreciate their investments, and throughout all of these years they will need at least as much wood as is needed this year. The contractors producing pulpwood for these mills also will be in business during these years and will need timber to cut. It is the wish and aim of each timberland owner to make as much money as possible each year from his timberlands. To all who are interested in growing and producing pulpwood let us urge you, for your own good, to seriously consider the Association rules only as a minimum or as a starting point in determining the kind or amount of timber you should leave at the time of each cut. To abide strictly by the rules means that in some cases you will not net enough from the growth on the remaining trees to pay for the taxes, whereas if you leave a good

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* Presented before group no. 4 of the Southern Pine Pulpwood Industry at Crossett, Ark.

[1] Associate Forest Economist, Southern Forest Experiment Station.

stand at the time of each cut, there is no evident reason why you cannot net at least $1.00 per acre per year from the growth. You will all agree that you can't chop out two out of every three rows of cotton and still hope to get much of a yield per acre. Neither can you cut out two-thirds of your tree crop and hope to get much in the way of returns from growth. Those of you who expect to be in the pulpwood production business for a long time in the future will also agree, it is hoped, that pulpwood stands close at home, or close to the pulpmill, are cheaper to cut and haul than stands 30 to 50 miles distant.

In all of these cuttings we have kept records of the costs of cutting pulpwood from trees of each size-class in order to determine whether some trees were costing more to cut than the value of the products obtained. These records, which we have on some 4,000 trees, indicate the number of minutes it takes to cut a tree into pulpwood and the corresponding pulpwood volume in the tree. From this information we have determined the cost of cutting a cord of wood (including felling, bucking, saw-filing, oil, and wedges) as follows:

Tree diameter (at 4½ ft. from the ground)	Cost of cutting per cord
4-5.9 inches	$1.40
6-8.9 inches	.90
9-11.9 inches	.72
12 inches and above	.76
Average of all trees cut	.80

Thus, on the basis of the number of minutes per cord, the cost of cutting trees 4 to 5.9 inches d.b.h. is almost exactly the cost of cutting a cord from trees 9 inches d.b.h. and above. Since the sale value of the pulpwood was $2 per cord, a margin between sale value and cost of production remained for stumpage and profit in all size-classes, but this margin was greatest in the 9-11.9-inch class and was least in the 4-5.9-inch class; for the total volume cut it averaged $1.20 per cord.

We know, of course, that many of you are having your cutting done by contract at so much per cord, regardless of the size of trees, so that it actually does not cost twice as much to cut trees 4-6 inches d.b.h. as to cut trees over 9 inches d.b.h. It does, nevertheless, cost considerably more to cut small timber even by contract, because it is necessary to have additional saw crews to cut the same amount of wood; and this means additional cost for more saws, more saw-filing, more wedges, and more oil. Also the hauling cost is somewhat greater for small wood than for large, and it costs considerably more to convert a cord of small wood into chips at the plant than it does to convert a cord of large wood. One should cut small trees into pulpwood only when clearing the land for farming or if the trees are badly suppressed, rotten, or crooked.

Not only does it cost more per cord to produce pulpwood from smaller trees than from larger ones, but the value per tree is very much less for the smaller trees. On the average, to make a cord of wood it takes about 106 four-inch trees, 50 five-inch trees, 27 six-inch trees, 16 seven-inch trees, 11 eight-inch trees, and 4 twelve-inch trees. With pulpwood stumpage at 75 cents per cord, 4-inch trees are worth about ¾ cent each, 5-inch trees about 1½ cents each, 6-inch trees about 2¾ cents, 7-inch trees about 4½ cents, 8-inch trees about 7 cents, 9-inch trees 9½ cents, and 12-inch trees about 20 cents each. (See table 1 for values of trees 4-15 inches d.b.h.) Thus 8-inch trees have a stumpage value 10 times that of 4-inch trees, while the cost of production is only half as much per cord.

On the other hand, we have found that small trees, with reasonably good crowns and spacing, are increasing in value at an extremely rapid rate. For instance in growing 1 inch in diameter a 4-inch tree increases 114 per cent in value, a 5-inch tree 80 per cent, a 6-inch tree 70 per cent, and a 7-inch tree 50 per cent. Surely most of us, as well as other timberland owners, could be interested in making 70 or 80 per cent on our money in about 3 years.

TABLE I.—VOLUMES AND PULPWOOD STUMPAGE VALUES OF SHORTLEAF AND LOBLOLLY PINE BY TREE SIZES ON THE CROSSETT EXPERIMENTAL FOREST

Diameter at breast height, Inches	Volume per tree Cubic feet	Number of trees per cord	Pulpwood value per tree at 75c per cord stumpage (Cents)	Value of 1 inch of growth in diameter (Cents)	Increase in value for 1 inch increase in diameter, Per cent
4	0.8	106.2	0.7	0.8	114
5	1.7	50.0	1.5	1.2	80
6	3.1	27.4	2.7	1.9	70
7	5.2	16.3	4.6	2.3	50
8	7.8	10.9	6.9	2.5	36
9	10.7	7.9	9.4	3.0	32
10	14.1	6.0	12.4	3.5	28
11	18.0	4.7	15.9	3.9	25
12	22.4	3.8	19.8	4.1	21
13	27.1	3.1	23.9	4.4	18
14	32.1	2.6	28.3	4.7	17
15	37.4	2.3	33.0	5.1	15

Quite often we hear the statement: "I can't afford to leave small trees because I have purchased all the pulpwood on this forty, and if I don't cut it all I will lose money." In a very few cases this may be true. There is one way, however, to buy pulpwood so that you may be absolutely certain to pay for only the amount that you cut: that is to buy on the cord basis. Such a method is absolutely fair to both buyer and seller and you do not have to worry as to whether your estimate of the amount of timber is correct. In fact you do not have to make an estimate. The only reason for buying timber on the 20- or 40-acre basis is because you think you can fool the seller on the amount of pulpwood present, and the man who owns the tract of timber thinks he can fool you. It's like buying a "grab-bag" package at a charity sale; you don't know what you've got until you unwrap it. But if you purchase by the cord both you and the landowner will know that you will get what you pay for. Furthermore, both of you can afford to leave a good stand at the time of cutting.

I have just one more thought to leave with you. I know that many contractors require the cutters to "pen" their wood, apparently as a means of "paying off." Of course there is nothing very wrong with this practice, especially if cutters are plentiful and you do not care how much wood each crew cuts per day. If labor is scarce, however, or if you are interested in having each crew cut as much as possible each day, then you should seriously consider changing this practice. We have tried both penning and not penning, and we find that loading costs when picking the wood off the ground differ very little if at all from those when loading the wood from pens. We have also found that it requires a fifth to a fourth of a crew's time to do the penning. Our crews would rather cut an extra 50 sticks of wood per day than spend that time in penning. This is, therefore, a way to obtain cheaper wood. In place of paying for the cutting on the basis of number of pens, we pay so much per 100 sticks and find that this method is entirely satisfactory. If the crews are not honest in their count or can't count, we assign each crew to a definite area and pay off on the number of cords that are hauled from that area.

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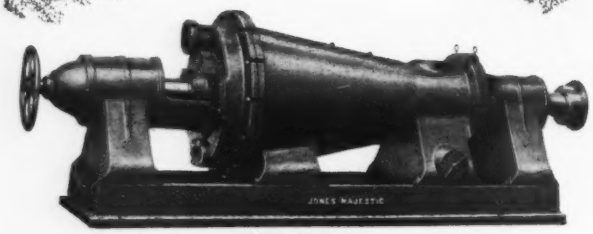
More Economically



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Our wide experience on every type of paper product assures selecting correct fillings for job—furnished in all types of metals: Regular or heat treated carbon steel, stainless steel, bronze, (phosphor or manganese), monel metal, etc.

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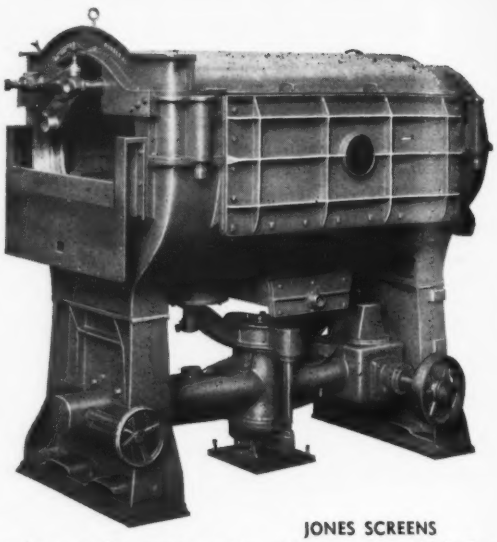

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Permits a gentle screening action with no forcing, which allows continuous passage of only clean, uniform fibres (round or multi-sided drums—bronze or stainless steel plates) assuring uniformity and cleanliness of sheet. Capacities up to 6,000 lbs. per hour.

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Cooking Engines	Beater and Jordan Fillings
Jones Jordans of all Sizes	Complete Stock Basalt Lava Fillings
Jones Bandless Plugs	Liebeck Disintegrators
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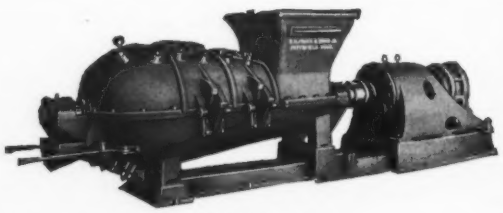
Agitating Equipment	



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Disintegrates all pulps in sheeted or lapped form. Handles paper machine broke trimmings, old papers, etc., (ideal for de-inking systems). Quick accessibility, low power consumption, low maintenance.

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If your production involves 75 tons and up per day, we offer the lowest cost pulp reducing method — the LIEBECK DISINTEGRATOR SYSTEM.

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of Quality Machinery for Paper Mills

Paper Makers Cooperate in Museum Exhibit

Franklin Museum In Philadelphia to Show Paper Making in Benjamin Franklin's Day Contrasted With Modern Industrial Processes at Dedication Exercises May 19-21—Paper and Cordage Assn. Hold April Meeting.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., April 25, 1938.—Paper Making in the days of Poor Richard, contrasted with the wonders of today's industrial processes in the same field, will be shown in the enlarged Exhibit of the Paper Industry at the Franklin Museum now being prepared for the dedication exercises on May 19, 20 and 21st. Four leading paper manufacturers in the Philadelphia area are collaborating with the management of the Museum in preparation for the event. Paper was made by hand in the days of Benjamin Franklin, Printer, and it will again be made by hand, in the Museum, by an expert English craftsman, one of the very few of his craft living in America today. Dressed in Colonial costume, he will dip his moulds into a vat of rag pulp, shake off the excess water, and couch the flimsy sheets onto a felt, just as in the olden days before the invention of modern paper making machines. To add interesting detail to the realism of the operation, tracings have been made of the private watermark of Benjamin Franklin, as it appears in the preserved copies of the originals of Poor Richard's Almanac, the design has been reproduced on an old style hand made mould, so that the paper produced in May, 1938 in the Museum, will be almost an exact duplicate of that used by Franklin nearly two centuries ago.

An old style wood cut, the kind used by Franklin for reproducing illustrations is being prepared, the type also will be authentic, and these materials will then be used on the old hand press from the Franklin Printing Company to demonstrate most dramatically the way paper and printing were produced in the days of the Father of the American Printing Art.

This turning back of the pages of history of the craft, and the industry will be done in the Paper Making Exhibit alongside the miniature Fourdrinier paper making machine which will simultaneously demonstrate the modern process by which the product of men's hands is multiplied many thousand-fold, over the old hand system, resulting in cheaper paper with all its implications for the spreading of news, education, and the records of business life. By photographs and moving pictures of modern giant machines, the status of the industry today will be shown. Side by side, with the ancient hand printing press, there will be in operation the most modern high speed machines, printing on modern papers, the latest achievements of the industry, in colors, unknown to the printers of Franklin's day, and from fine screen halftone plates.

Other exhibits will show the development of paper for books, for advertising, for offset printing, and for social stationery.

Personnel of Exhibit Committee

The organization of the Exhibit is being directed by a committee of which Norbert A. Considine, former president of the Paper Trade Association of Philadelphia is chairman. Assisting him is Harrison Elliot of New York, Advertising manager of the Japan Paper Company, and a well known authority on the History of Paper Making, especially the hand-made and primitive aspects of the art. Mr. Elliot was associated for many years with Dard Hunter, author of the classic books on the history of Early Paper Making. Cooperating also are Wm. Ingersoll and Hubert Foster, Sales Manager and Advertising Manager of the Dill & Collins Company of Philadelphia, members of the century old fraternity of local business institutions, who trace their commercial lineage back to the mill of David Rittenhouse, the first paper maker in America, who in 1690 brought the art to the banks of the Wissahickon from Europe. Others on the committee are Hugo H. Hanson and Joseph C. Dunton of W. C. Hamilton Company at Miquon on the Schuylkill, and Herbert Mason and Irwin Megargee of Curtis & Bro., Newark, Delaware. Both of these concerns have their roots far back in the early years of the 19th Century, before the introduction of wood as a paper making material, when Philadelphia and its vicinity was the heart of the American paper making world. Mr. Megargee is a member of an old Philadelphia paper making and paper wholesaling family, that for many generations has provided leaders in the local trade, whose family history is rich with the legends of the early days.

Finally the committee includes P. H. Glatfelter and Wm. S. McClellan of the Glatfelter Company at Spring Grove, Penna. Mr. Glatfelter's grandfather bought the original paper mill in York County, where newsprint for Philadelphia newspapers was being made from straw, while Lee's Army was advancing on Gettysburg. The mill was among the earliest to take up the manufacture of paper from wood, and has developed under three generations of Glatfelters into one of the leading producers in the east of the grades of paper used in modern book publishing.

Other exhibits will round out a display for the industry that promises to be one of the most striking in the Museum from an educational as well as an historical viewpoint. The exhibits, with the exception of the actual making of paper by hand, will be continued at the Museum for some months after the dedication ceremonies.

Paper and Cordage Assn. Meet

Members of the Philadelphia Paper & Cordage Association, Inc., at their April meeting, held at noon April 22d in Hotel Adelphia, were entertained by political speakers, representing the Democratic and Republican parties of Pennsylvania. Charles Vorhees President of Young Republicans, spoke on behalf of the Republican candidate, Judge Arthur James, while A. J. Nydick, Philadelphia attorney, spoke for the Democratic party candidate, Attorney-General Margiotti, who is running for the Gubernatorial nomination at the Primary Election, May 17th. The program was arranged by the chairman of the Entertainment committee, E. K. Lay, and is in accord with the As-

(Continued on page 77)

Financial News of Pulp and Paper Industry

Acquisition By Celotex Corp. Of Important Block Of Stock In Certain-teed Products Corp. Is Approved By Court — Kimberly-Clark Corp. Earns 89 Cents Per Share In First Quarter—To Refinance Lake Sulphite

NEW YORK STOCK EXCHANGE

High, Low and Last for the Week Ending April 27, 1938

	High	Low	Last
A. P. W.	2½	2¼	2½
Armstrong Cork Co.	33	29¾	31½
Celotex Corp.	20¼	19	19⅜
Celotex Corp., pf.	55	54¼	55
Certain-Teed Products Corp.	7¼	6⅝	6¾
Certain-Teed Products Corp., pf.	28½	26	26
Champion Paper & Fibre Co.	20	19¾	20
Congoleum-Nairn Co.	20⅞	18¾	20⅜
Container Corp. of America	12¾	11⅝	11⅝
Continental-Diamond Fibre Co.	7¾	7	7
Crown-Zellerbach Co.	10⅜	9⅝	9⅝
Flintkote Co.	16¾	15	15⅞
Robert Gair	3⅝	3¼	3½
Robert Gair, pf.	12	11½	12
International Paper & Power	7⅞	6⅞	7⅛
International Paper & Power, pf.	29⅞	26¾	28
Johns-Manville Corp.	69¼	65½	66¾
Johns-Manville Corp., pf.	125	124½	124½
Kimberly-Clark Corp.	22½	22	22
MacAndrews and Forbes	31	31	31
Masonite Corp.	32½	31	31¼
Mead Corp.	10½	10	10
Paraffine Companies, Inc.	38	38	38
Ruberoid Co.	20½	18¾	20¼
Scott Paper Co.	39¼	38	39
Sutherland Paper Co.	23	23	23
Union Bag & Paper Corp.	10⅞	10	10½
United Paperboard Co.	4¾	4⅝	4¾
U. S. Gypsum Co.	74¼	68½	72¾
U. S. Gypsum Co., pf.	164	163¾	164

NEW YORK CURB EXCHANGE

High, Low and Last for the Week Ending April 27, 1938

	High	Low	Last
American Box Board Co.	8¼	8	8¼
St. Regis Paper Co.	3¼	2⅞	3
Taggart Corp.	4¼	4	4⅛

Celotex Deal Approved

Acquisition by the Celotex Corporation from Phoenix Securities Corporation of an important block of stock in Certain-teed Products Corporation was approved last week by Referee Harry C. Kane in Supreme Court, New York County. Referee Kane, who had been appointed by Justice Ferdinand Pecora to review the fairness of the acquisition which was under challenge by minority shareholders, filed a 17-page report with the court reviewing all of the facts in the transaction.

The transaction involves acquisition by Celotex of 109,360 shares of Certain-teed common and 9,496 shares of Certain-teed 6 per cent preference stock, for which Celotex delivers to Phoenix Securities Corporation 43,744 shares of its common stock and $569,760 in cash. The cash is to be paid 25 per cent upon delivery of the Certain-teed stock and the balance in three equal annual installments, each bearing interest at 3 per cent per annum.

"Upon all of the evidence," said Referee Kane, "I respectfully report that the price proposed to be paid by Celotex (for the Certain-teed shares) was not unfairly arrived at and cannot be said to have resulted from any inequitable conduct."

Referee Kane also reviewed the question as to whether the board of Celotex was independent and disinterested and concluded that "furthermore, Celotex has been represented by a majority of independent and disinterested officers and directors."

He also pointed out that the acquisition had been approved by a majority of the Celotex stockholders at a meeting in January, 1938, at which "the stockholders were given sufficient information upon which to render their opinions." The referee therefore concluded that "the court should not disturb this transaction since an overwhelming majority of the stockholders of Celotex have expressly approved the deal."

Kimberly-Clark Reelect Officers

[FROM OUR REGULAR CORRESPONDENT]

NEENAH, Wis., April 25, 1938.—All officers and directors of the Kimberly-Clark Corporation were re-elected at the annual meeting of stockholders and directors at the company's offices Tuesday afternoon, April 19.

They are as follows: President, F. J. Sensenbrenner; executive vice-president, Ernst Mahler; vice-presidents, J. S. Sensenbrenner, S. F. Shattuck, C. H. Sage and C. G. Parker; secretary and comptroller, J. F. Hunt; treasurer, W. H. Clifford; assistant secretary and treasurer, F. E. Sensenbrenner. All are members of the board of directors except Mr. Hunt and Mr. Clifford, Board members additional to the above are: H. G. Boon, Appleton, Wis.; John R. Kimberly, Neenah, Wis.; C. B. Clark, Neenah, Wis.; M. L. Emerich, Chicago, Ill.; John Hancock, New York City; Walter Kasten, Milwaukee, Wis., and J. C. Kimberly, Washington, D. C.

In reviewing operations for the first quarter of 1938, Vice-President Parker pointed out that earnings were equal to 89 cents per share on common stock, after the deduction of preferred dividends and all charges, including the tax on undistributed profits. These earnings compare with 92 cents a share in the comparable period of 1937, and were after an estimated allowance of $41,500 for nine months' losses of the William Bonifas Lumber Company, Marenisco, Mich., a subsidiary.

Earnings in the 12 months ending March 31 were equal to $3.52 per common share, an increase over the comparable period ending March 31, 1937, when the net was $2.27 per share.

To Rehabilitate Lake Sulphite Co.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., April 25, 1938.—Hon. Peter Heenan, Minister of Lands and Forests for Ontario, states that plans for the rehabilitation of the Lake Sulphite Pulp Company, Limited, at Red Rock, Ont., are now under consideration by a committee of shareholders, with every prospect that the enterprise now in receivership, will be re-financed satisfactorily. He declares that two, and probably three, offers to revitalize the collapsed industry will be studied by the committee. Mr. Heenan added that despite the failure of the company before the completion of the plant, he

is encouraged by the belief that a sound plan for its revival will be evolved and that the mill will yet become one of the best producers in Ontario.

Eddy Stockholders to Vote on Purchase

Stockholders of the Eddy Paper Corporation will vote at a special meeting on May 17 on a proposal to purchase the common stock of the Rochester Folding Box Company with no more than 7,156 shares of Eddy capital stock. In order to do so they will be asked to authorize an increase in the number of Eddy Paper shares from 178,000 to 200,000. The balance not required for the proposed purchase will remain unissued.

Mead Corp. Profits Lower

Mead Corporation and subsidiary companies, for twelve weeks ended March 19, report a net profit after minority interest of $153,939, equal to 8 cents each on 619,374 common shares after dividend requirements on Series A and B preferred stocks, Net profit last year was $550,716, or 82 cents a common share after dividend requirements on Series A preferred stock only.

A. Thomson to Speak at Miami

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, April 25, 1938.—Alexander Thomson, president of the Champion Paper and Fibre Company of Hamilton, Ohio, will address the students and faculty of Miami University at Hughes Hall next Friday.

Mr. Thomson will deliver a talk in regard to bringing about an understanding between the public and employers of large numbers of laborers.

Sutherland Paper Earnings

The Sutherland Paper Company reports for the quarter ended in March a net profit of $194,905, equal to 68 cents each on 287,000 shares of $5-par capital stock, against $215,270, or 75 cents a share, a year earlier. Twelve months to March 31: Net profit, $784,565, or $2.73 a share, compared with $792,229, or $2.76 a share, for the preceding twelve months.

Hammermill Net Income Down

Net income of the Hammermill Paper Company and subsidiaries for 1937 after $140,000 surtax, amounted to $310,489, equal, after preferred dividends, to 48 cents each on 180,000 common shares, compared with $495,980, or $1.46 a common share, in 1936.

Whitaker Paper Declares Dividends

Directors of the Whitaker Paper Company have declared a dividend of $1 on the common stock and the regular quarterly dividend of $1.75 on the preferred stock. Both are payable July 1 to stockholders of record June 18.

Hurlbut Paper Co. Has Loss in 1937

Hurlbut Paper Company, Inc., South Lee, Mass., reports for 1937 net loss of $45,400, compared with 1936 loss of $82,208.

REPORTS ON SOUTHERN PINE

(Continued from page 12)

Ottawa, has given a third reading to a bill amending the Lord's Day Act. The measure has been changed from its original form. When it passed the House of Commons the bill would have imposed imprisonment of directors and superintendents of employes who ordered performance of unnecessary work on Sunday. The Senate deleted the jail provisions, wiped out the personal liability of individuals and finally made corporations who broke the Sunday observance law liable to increased fines up to two thousand dollars for third and later offences.

Provincial Paper Adds Improvements

A. G. Pounsford, manager of the Port Arthur mill of Provincial Paper, Limited, says that the program of renovation work to the plant which was decided upon last year will be continued. A new suction press, part of a plan of renovation to make possible production of better quality on No. 2 paper machine, has just been put into service. Other equipment improvements will be made later. Mr. and Mrs. Pounsford have returned home after enjoying a month's cruise to Porto Rico, Venezuela, Colombia, Panama and other neighboring countries.

Ontario To Erect Pulp Wood Plant

It is learned that the Ontario Paper Company, Limited, Thorold, Ont., will construct a pulp wood handling and barking plant, with power house, power line, wharf and housing for the staff near Heron Bay Ont. and tenders are now being received for the erection of the plant and other units. In the re-allocation of limits made by the Ontario government the Ontario Paper Company was granted a pulpwood limit on the Black River.

Scott Salesmen Meet in Boston

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 25, 1938—Boston divisional meetings of the industrial and retail departments of the Scott Paper Company were held at the Hotel Copley-Plaza today when programs were outlined on advertising for the next four months and policies and selling plans discussed. Executives present from the main office of the company in Chester, Penna., were William F. Mohan, vice-president in charge of sales; D. A. Prouty, retail sales manager; Harry Pardee, advertising manager; George Swatek, industrial sales manager; W. S. Campbell, sales promotional manager, and H. A. Lamor, Eastern regional sales manger.

A separate meeting was held for the industrial department, conducted by Richard Testut of that department. The retail group was led by W. R. Draper, divisional sales manager.

The company is in a four weeks oversold condition, with the future outlook quite bright.

To Deal in Paper at Brockton

[FROM OUR REGULAR CORRESPONDENT]

BROCKTON, Mass., April 25, 1938.—M. F. Ellis, 297 Montello street, is a new corporation to deal in paper, bags, twine and small wares. Capital, 100 common shares of no par value. Merton F. Ellis is president and treasurer; Shirley E. Small, clerk, and I. Manuel Rubin the third incorporator.

New England TAPPI Meets at Worcester

The New England Section of the Technical Association of the Pulp and Paper Industry met on Friday evening, April 22, at the Putnam & Thurston Restaurant, Worcester, Mass., for dinner, after which the meeting opened with John B. Chalkin, chairman, presiding.

Technical Advancements

Dr. William F. Talbot, of the Dennison Manufacturing Company, Framingham, Mass., was the first speaker his subject being, "Technical Advancements and International Relations." Dr. Talbot presented a very interesting paper in which he discussed the economic factors which are influencing the present international situation. Economic stability is closely allied to technological advancements that many nations have turned to the latter field to further their position as world powers. Dr. Talbot traced briefly the recent technical developments in Europe which have in some cases increased the prestige and power of countries which have turned their efforts to these developments. The possession of the important basic materials has always been the underlying cause of strained international relations. The present European situation is evidence of these accepted truths and a continuous scramble for additional territory.

John B. Tuttle Speaks

John B. Tuttle of the engineering division of the Standard Oil Company of New Jersey was the second speaker with "Paper Uses Petroleum," as his subject.

Past and Present Developments

Mr. Tuttle's talk was confined to a review of the past and present developments regarding the use of petroleum products in the paper field. A very small percentage of these products are in use in paper making. Of this small percentage the major part is used in the graphic arts field which requires very large quantities of oil bases for printing inks.

By far the most widely used oil product is paraffin. It finds application in a great variety of uses. Some of the most important ones are—its use in an amulsion form and mixed with rosin sizes for beater application; its use as a waterproofing agent on food container stock; lampshade impregnation and various specialty papers such as carbon paper coatings and slip sheet paper for the printing industry; asphalt also finds considerable application in the manufacture of waterproof papers for structural uses.

Fertile Field for Research

The wider use of petroleum in paper making will occur only as the paper chemist continues to investigate its possible applications. He has brought about its present wide use as the oil companies have not applied their research departments to this field due to lack of close contact with paper requirements. Mr. Tuttle stated that the use of oil products in paper making offers a very fertile field for research.

Interesting discussions followed these two papers.

Those in Attendance

Among those present were: Frank Marsey, Bird & Sons, E. Walpole, Mass.; D. E. Gagnon, and H. L. Thompson, Nashua River Paper Company., E. Pepperell, Mass; A. F. Gilmore, Bird & Sons, E. Walpole, Mass.; H. B. Freeman, American Cyanamid and Chemical Corporation, Boston, Mass.; D. B. Allan, Nashua River Paper Company, E. Pepperell; Paul Knight and C. A. Homan of Bird & Sons, E. Walpole, Mass.; F. H. Dwyer, Nashua River Paper Company, E. Pepperell; A. L. Perry, Krebs Pigment and Color Corporation, Boston Mass.; J. C. Pickering, Pervil Corporation, Worcester, Mass.; H. L. Mellen, Deerfield Glassine Company, Monroe Bridge, Mass.; H. T. Barker, Bird & Son, E. Walpole, Mass.; Jack Dickson, R. T. Vanderbilt Company, New York, N. Y.; F H. Lovenberg, George Mann & Company, Providence, R I.; Walter Scott, G. J. Esselen Inc., Boston, Mass.; Robert Metcalfe, Clarence Flint and Roy Charron of U. S. Envelope Company, Worcester, Mass.; Harold Pugsley, Roger Clapp of Dennison Manufacturing Company, Framingham, Mass.; Robert Emerson, same company; G. E. Mangsen, A. M. Altieri, R. J. Proctor and F. J. Delea of Fitchburg Paper Company, Fitchburg, Mass.; Robert Mannheim, Mathieson Alkali Works, Providence, R. I.; F. P. Swallow, Logan Drinking Cup Company, Worcester; G. A. Thompson, Jr., B. F. Perkins & Son, Holyoke, Mass.; E. M. Eressy, Prager Company, Worcester; William Schwartz, Northbridge, Mass.; L. M. Start Jr., Rice, Barton & Fales Inc., Worcester; Jack Duston, Stowe-Woodward Inc., Newton Upper Falls, Mass.; W. J. Ford, W. Dudley Paper Company, W. Dudley, Mass.; P. B. Holden and Roy Tewksbury, Stowe-Woodward Inc, Newton Upper Falls.; D. K. Bartlett, W. Dudley Paper Company, W. Dudley; W. O. Johnson, Westfield, Mass.; A. B. Green, Needham, Mass.; L. W. Hutchins, Colonial-Beacon Oil Company, Boston; William Talbot, Dennison Manufacturing Company, Framingham; Helen U. Kiely, American Writing Paper Company, Holyoke; John B. Tutle, Standard Oil Company of New Jersey, New York, N. Y.; J. B. Calkin, Dennison Manufacturing Company, Framingham; R. H. Doughty, Fitchburg Paper Company, Fitchburg, Mass.; G. A. Peterson, Rice, Barton & Fales Inc., Worcester, Mass; G. R. Alden, Dennison Manufacturing Company, Framingham.

Ohio to Meet with Superintendents

A joint dinner meeting of the Ohio Section of the Technical Association of the Pulp and Paper Industry and the Miami Valley Division of the American Pulp and Paper Mill Superintendents Association will be held at the Hotel Manchester in Middletown, Ohio, May 14.

The program for the meeting will be divided into two parts. Roy Zellers of the French Paper Company, Niles, Michigan, will talk on the subject "Something to Think About." Mr. T. C. Roberts of the Beloit Iron Works, will show forty minutes of sound pictures which describe the manufacture of kraft paper from the trees to the finished product of shipping containers.

Dinner reservations can be made by writing Kenneth L. Jackson, Champion Paper and Fibre Company, Hamilton, Ohio.

Obituary

Walter J. Raybold

Walter J. Raybold, 73, president of the Rising Paper Company, Housatonic, Mass., died at the House of Mercy Hospital, Pittsfield, Mass., April 21.

Mr. Raybold was a native of Lanesboro, Mass., and was educated in the public schools there. He began his business career with the Agawam Paper Company, West Springfield, Mass. In 1899 he was organizer and sales manager of the B. D. Rising Paper Company and later was elected president of the succeeding company, the Rising Paper Company, which position he held at his death.

Mr. Raybold had been recently elected a member of the American Paper and Pulp Association, and the American Paper Exports, Inc., of New York. Last month he was elected president of the Boston Paper Trade Association.

Mr. Raybold was a director of the Berkshire Life Insurance Company, Berkshire and Hampshire Mutual Fire Insurance Companies, and a trustee of the Berkshire School for Crippled Children and Berkshire Home for Aged Women. For twenty-seven years he was a director of the Pittsfield Y.M.C.A. and its president for six years.

Surviving are his widow, two daughters and a sister.

Edward C. Rauch

Edward C. Rauch, 78, president of the Consolidated Paper Company, Monroe, Mich., died at his home April 12 from a heart attack. He had been in ill health since returning from Florida several weeks ago.

Mr. Rauch was born in Ida township and attended the district schools. In his earlier years he operated general stores at Britton and Dundee. He came to Monroe with L. W. Newcomer, now treasurer of the Consolidated Paper Company, to operate a clothing store and later operated a cordage and sporting goods store.

More than 40 years ago, Mr. Rauch and Augustus C. Boehme purchased the Eagle paper mill and founded the Boehme and Rauch mills. In 1921 these were consolidated with the Monroe Binder Board Company to form the Consolidated Paper Company, of which Mr. Rauch had been president since its organization.

Mr. Rauch was a former mayor of Monroe and a member of the charter revision committee. He was an active member of the First Presbyterian Church and the Monroe Masonic lodge.

Surviving are his widow, a son H. Lee Rauch, vice-president and general manager of the Consolidated Paper Company and a daughter.

Edgar Percy Lawson

Edgar Percy Lawson, 65, chairman of the board, E. P. Lawson & Co. Inc., 426 West 33rd St., New York, died April 18 at Safety Harbor, Florida. Mr. Lawson, whose home is at Southport, Conn., had spent the winter in the West Indies cruising on his yacht "Infanta."

Born in Alabama, Mr. Lawson came to New York in 1898 and introduced Seybold paper cutting machines in the Eastern states. Later, he formed his own company to handle this line of machinery and his firm subsequently became selling agents for the Seybold Division of the Harris Seybold Potter Company. Until 1936 he served the Lawson firm as president. In that year he became chairman of the board.

At the time NRA was announced, Mr. Lawson was prominent in the formation of the New York Printing Machinery Dealers Association and took an active part in the National Printing Equipment Association.

He was a member of the New York Yacht Club, the Lotus Club, Manhasset Bay Yacht Club, Mosaic Lodge No. 418 F. & A. M., Life member and Royal Arch Master of Corinthian Chapter No. 159 F. & A. M., and a member of Ivanhoe Commandery No. 36, Knights Templar.

He is survived by his widow, Mrs. Ann Orr Lawson and a daughter Jeanne, who is a student at Vassar College.

Indianapolis Reports Improvement

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., April 26, 1938.—The past week saw some slight improvement in paper demand in this section. For one thing weather conditions were better and communications were resumed with those sections cut off by floods. Fair weather and warmer has served to call attention of many paper users that spring is here and they are responding to the change in the seasons.

In the newsprint field there was some reaction toward the end of the week to the heavy volume of Easter business. Advertising lineage was heavy the first of the week when the larger stores staged their poct-Easter sales, but toward the end lineage was cut.

Another bad omen, this for the makers of cartons and other paper containers for the fruit and vegetable, their business this spring is likely not to be so good as it was last year. Much of the fruit in many sections of the state, has been heavily damaged by early warm weather followed by the severe cold spell. Vegetables have been hurt but many of these can be replanted and may make a crop, even though it will be a late one.

The fine paper field is on an even keel with demand for books, covers and ledgers ruling steady and no change in price. Inquiries are being received for summer specialties, but orders thus far have not been heavy.

Container business going to the ice cream field is picking up. The enormous number of small ice cream places, which close in the winter, are opening and since they all use only paper cups, they are buying supplies. Most of these companies are subsidiaries of wholesale milk and ice cream companies.

Demand for building paper showed a slight improvement last week, but it is considerably below the same time last year, although there are some who predict building will be ahead of last year when it is done.

Gummed Tape & Devices Co. Expands

The Gummed Tape and Devices Company will on May 2 consolidate its general offices and Eastern warehouse in a model loft, twice the size of its present quarters, but in the same Bush Terminal Building, where it is now located. The address and telephone number Sunset will therefore remain unchanged.

Abraham Mazer to be Honored by Paper Industry

Abraham Mazer, president of the Hudson Paper and Pulp Company and one of the early pioneers in the paper industry, will be honored at a testimonial dinner which will be given on Tuesday evening, May 10 at the Hotel Astor under the auspices of the Paper and Allied Trades Division combined drive in behalf of the Joint Distribution Committee and the United Palestine Appeal, it was announced last week by Jacob Sincoff, president of the Empire Box Board Company, who is chairman of this Division.

Mr. Mazer, who has been one of the outstanding figures in the paper industry for more than forty years, has evinced a keen personal interest in the effort of the Joint Distribution Committee and the United Palestine Appeal to bring relief and rehabilitation in Central and Eastern Europe and to promote the settlement in Palestine of homeless and oppressed Jews. He has been affiliated with many philanthropic causes and has been particularly active in behalf of the Hebrew University in Palestine which he has visited on various occasions during the past decade.

The testimonial dinner to Mr. Mazer will give many leaders in the paper industry an opportunity to pay tribute to one of its most beloved and admired leaders, as well as to aid the paper industry's drive to raise a substantial sum for the work of the Joint Distribution Committee and the United Palestine Appeal.

Plans for the dinner are being made by a committee consisting of Mr. Sincoff, chairman; Isaac Gilman, of the Gilman Paper Company, treasurer; Milton Collier of the Pennsylvania Exchange Bank, David Kasson of thhe Harlem Paper Products Corporation, and Benjamin Kushell of the International Gummed Tape Company.

Mr. Mazer's connections with the paper industry date back to its earliest stages. He entered the jobbing business at a time when the inauguration by him of regular paper deliveries in New York City by means of a horse and wagon was a radical innovation, for prior to that, all deliveries had been made by means of the primitive push-cart. For the past twenty years Mr. Mazer has been an outstanding manufacturer of paper, owning mills in Maine, Vermont and Pennsylvania.

Arranges for Pulpwood Supply

BANGOR, Me., April 25, 1938.—Two petitions by the Eastern Manufacturing Company have been allowed by Judge John A. Peters in the United States district Court.

The first was for authority to advance its subsidiary, the Lincoln Pulpwood Company, Limited, principal of $50,000 and interest of $8,583 due May 1 in part payment on a $300,000 mortgage held by the Chicago Title and Trust Company. The original agreement, made in June, 1937, was that $50,000 should be given in cash, with annual payments of $50,000 over a period of five years. There was no objection to the granting of this petition.

The second petition was for authority for the Eastern Manufacturing Company to contract with its subsidiary, the Eastern Manufacturing Corporation, for "substantially" its entire requirements of pulpwood for the ensuing cutting season. The estimate is 80,000 cords.

Personnel of Howard Paper Mills

Following a recent meeting of the board of directors, Colonel H. Maxwell Howard, president of the Howard Paper Company, Urbana, Ohio, and allied mills, the Maxwell Paper Company, Franklin, Ohio, the Aetna Paper Company, Dayton, Ohio, and the Dayton Envelope Company, Dayton, Ohio, announces the reelection of Harry A. Legge, long associated with the Howard mills, as managing director of all four allied Howard companies.

W. B. Zimmerman has also been elected a director of the Maxwell Paper Company and L. P. Boswell a director of the Aetna Paper Company.

The affairs of these companies are now in charge of the following executives:—

The Howard Paper Companp:—H. M. Howard, president; W. R. Howard, vice-president and secretary; L. S. Howard, treasurer; H. A. Legge, assistant treasurer.

The Maxwell Paper Company:—H. M. Howard, president; W. R. Howard, vice-president; H. H. Hoffman, secretary; L. S. Howard, treasurer; W. B. Zimmerman, assistant secretary; H. A. Legge, assistant treasurer.

Dayton Envelope Company: — H. M. Howard, president; W. R. Howard, vice-president; H. H. Hoffman, secretary; L. S. Howard, treasurer; H. A. Legge, assistant treasurer.

The Aetna Paper Company: — H. M. Howard, president; H. H. Howard, vice-president and treasurer; L. P. Boswell, secretary; H. W. Santen, assistant secretary; H. A. Legge, assistant treasurer.

Paper Drinking Cups Advertise Fair

Paper drinking cups for railroads, steamship lines, airplane lines and hotels are being used to advertise the 1939 Golden Gate International Exposition throughout the United States and possessions.

Cooperating with the $50,000,000 World's Fair of the West, the Zellerbach Paper Company is offering the cups printed in two colors with attractive illustrative perspectives of the Fair and the two Bay bridges. These cups come in four sizes, 3-ounce untreated water cup, 7½-ounce treated soda cup, 10-ounce soda container, and 9-ounce hot drink cup. Cost of printing is borne by the paper company, not by the consumer.

According to E. R. Steiger, Pacific coast manager of the Cup Division of the Zellerbach firm, distribution of these cups will be pushed as an important advertising medium for the Fair. Efforts are being made to place the cups in all leading Western hotels, office buildings, and with various spring water companies. Samples are also being sent to Hawaiian and Alaskan firms.

Champion to Issue DeLuxe Sample Book

The Champion Paper & Fibre Company, Hamilton, Ohio, have in process of preparation a de luxe sample book of the Champion lines, done in the loose-leaf style with the idea in mind of maintaining the sample sheets up-to-date and representative through such replacement as may be necessary to keep pace with improvements in manufacture as made from time to time. Besides the well known book papers, the book will contain one or two other certain grades of paper.

To Make Insulating Board at Brunswick

Brunswick, Me., is anticipating a new industry which may grow into a sound economic asset to the community. In brief, the Pejepscot Paper Company is producing a new type of insulating material, marking a great advance in the insulation for buildings, vehicles, refrigerating units and other commercial purposes.

Special production machinery has been installed on the upper floors of the Dunlap block, and the finished product is already shipped to all parts of the country. Five men are now employed by the plant, and if this product, Air-Met, sells as well as expected, the production will grow into an industrial benefit to the town.

Air-Met is made by attaching sheets of aluminum foil to sturdy paper in such a way that between the two are formed triangular air cells. It is from this construction that Air-Met gets its name—"Air" from the air cells, and "Met!" from the metal sheathing of aluminum foil.

Air-Met was developed by a New York City engineer, E. L. Benedict, who visits Brunswick frequently to co-operate in its product. Mr. Benedict holds the patent rights to Air-Met. To the Ruberoid Company, nationally known manufacturers of roofing, building and insulating materials, Mr. Benedict has assigned the marketing and distribution of the new product. Through the sales efforts of the Pejepscot Paper Company's New York office, a contract was negotiated with Mr. Benedict, which brought this industry to Brunswick. It provides for manufacture of paper and conversion of the product "Air-Met."

Cardinal Paper Co. Starts at Kalamazoo

KALAMAZOO, Mich., April 18, 1938—The Cardinal Paper Company, a new wholesale concern in Kalamazoo, is located at 326 West Kalamazoo avenue. The firm will handle fine papers, catering to the printers in this territory. Guy Hart is president of the new company, Neil Abrams treasurer, and Robert Anderson is secretary and general manager, and Duane Hicks in charge of sales. All are residents of Kalamazoo.

Acquires Fine Papers, Inc.

ROCHESTER, N. Y., April 25, 1938—The Franklin-Cowan Paper Company, paper merchants and mill distributors, 141-143 East Swan street, Buffalo, N. Y., has acquired Fine Paper Incorporated, of this city, and will continue to operate under that name as an affiliated company of the Franklin-Cowan Paper Company. The activities of the Franklin-Cowan Company in the Rochester territory will be greatly expanded because of this acquisition.

Boston Paper Men Hold Luncheons

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 25, 1938.—A luncheon meeting of the Cost Finding Group of the New England Paper Merchants Association was held Friday at the Boston Chamber of Commerce, with Chairman Floyd H. Blackman presiding. The subject for discussion was The Set-up of Salesmen's Price Books.

A luncheon meeting of the Fine Paper Division is to be held Thursday at the Chamber of Commerce.

United Paper Co. Meets

The United Paper Company, Inc. of Richmond, Va., held its Spring Sales Meeting at the John Marshall Hotel from March 31 through April 2nd.

A feature of the meeting was the showing, on the evening of April 1, of a talking moving picture entitled "The Story of Southern Kraft." This movie was loaned the company by the Southern Kraft Corporation.

The meetings were conducted by the officers: R. F. Sycle, president; J. L. Buchanan, vice president; J. L. Hazelgrove, secretary.

The sales department and office personnel attending the meetings included: T. L. Sarvay, L. W. Ciucci, J. H. Woodson, M. E. Mitteldorfer, Luther Revere, J. H. Burcher, E. J. Jones, Jr., J. N. Fisher, D. M. Bacharach, F. L. Williamson, Jr., E. C. Cluff, J. L. Prentice, W. G. Birnbaum, J. L. Buchanan, Jr., Miss E. A. Bloom, and Mrs. F. B. Coleman.

Among the 100 specially invited guests at the showing of the moving picture were George Stuhr and A. D. Unger, both of Southern Kraft Corporation; Nathaniel Robinson of Brown Company, and W. T. Maynard of Minnesota Mining and Manufacturing Company.

These meetings are annual affairs and are considered of great value to executives, salesmen and office employees.

Thomas M. Cook Goes to Peru

POTSDAM, N. Y., April 25, 1938—Thomas M. Cook, paper chemist at the Racquette River Paper company, Unionville, for the past two and one-half years, will sail from New York City April 30 for Peru, where he will enter the employ of W. R. Grace & Co., who are beginning the paper making industry there. Mr. Cook will do chemical research on sugar cane fibre before a large paper mill is built in Peru.

The trip will be through the Panama Canal and down the west coast of South America. It will require twelve days. Mr. Cook will dock at Callao, Peru, where he will take a plane to Paramonga, a sugar plantation and the site of the proposed mill.

Mr. Cook is a graduate of Syracuse University College of Forestry.

Michigan Paper Co. Wins Plaque

KALAMAZOO, Mich., April 18, 1938—Members of the safety council and mill executives of the Michigan Paper Company at Plainwell held a meeting on April 14 to celebrate the winning of first prize in the Paper Mill Safety Contest sponsored by the Michigan Mutual Liability Company of Detroit. The presentation of the bronze plaque was made by the safety engineer of the insurance company. This is the second successive year that the Michigan Paper Company has been awarded the prize in competition with twelve other mills in the state.

Robert Gair Co. Makes Appointments

Robert Gair Company, Inc., announces the following appointments:

A. J. Slade, sales manager of Folding Carton Divisions; W. R. Callaghan, sales manager of Eastern Folding Carton Divisions; H. J. McPhilliamy, sales manager, Shipping Container Divisions; E. K. Mansfield, consultant to Engineering Department; John Warner, chief engineer.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Chicago, Ill.—The Perfection Box Company, 555 West Munroe street, manufacturer of paperboard boxes and containers, has recently leased space in building at 4520 West Fullerton avenue, and will occupy for plant. Present works have been removed to new location.

Peshtigo, Wis.—The Badger Paper Mills, Inc., manufacturer of bleached sulphite fiber specialties, has begun erection of new digester and blow pit buildings, for which general contract recently was let to John Salen & Son, 1109 Michigan avenue, Menominee, Mich., as previously noted in these columns. Work will consist of two units, instead of one structure, as mentioned in former reference, comprising a four-story building, 24 x 24 feet, and two-story structure, 28 x 32 feet. No estimate of cost has been announced. Work is scheduled for completion in August.

Rochester, N. Y.—The Eddy Paper Corporation, Three Rivers, Mich., manufacturer of container board, box board and kindred paper stocks, is arranging for an increase in capitalization from 178,000 to 200,000 shares of stock, of which 7156 shares will be used for purchase of common stock and controlling interest in the Rochester Folding Box Company, Boxart street, Rochester, manufacturer of corrugated and other folding boxes and containers, which will be operated as an affiliated interest in the future.

Front Royal, Va.—The American Viscose Corporation, 200 Madison avenue, New York, N. Y., manufacturer of viscose rayon products, will begin work soon on superstructures for main mill units at new plant at Front Royal, where large tract of land was acquired a few months ago, as previously reported in these columns. The mill will comprise a series of one and multi-story buildings to total about 450 x 2000 feet, with power house, pumping station and other mechanical divisions. Entire project is estimated to cost in excess of $1,500,000, and is scheduled for completion early in 1939. George M. Reaves is superintendent in charge of construction.

York, Pa.—The United Wall Paper Factories, Inc., has resumed operations at local mill on a full capacity schedule, after a curtailment of several weeks. It is expected to maintain regular production on such basis for an indefinite period. Robert C. Evans is general manager.

Jarratt, Va.—The Johns-Manville Corporation, 22 East Fortieth street, New York, N. Y., manufacturer of roofing products, insulating board specialties, fiber products, etc., has engaged the Stone & Webster Engineering Corporation, 49 Federal street, Boston, Mass., and 90 Broad street, New York, N. Y., engineer and contractor, to prepare plans and supervise erection of proposed new mill at Jarratt, referred to in these pages last week. Plant will consist of a series of one-story units, with power house, pumping station, machine shop and other mechanical buildings, and is estimated to cost about $1,000,000 with machinery. It will be used for the production of insulating board from wood pulp. Company is arranging also for the establishment of a townsite at the new location, with housing development for operatives at the mill. Walter F. Bozarth, Williamsburg, Va., construction engineer, will be in charge of the last noted part of project.

Kalamazoo, Mich.—The Kalamazoo Wax Paper Products Company, Inc., has acquired plant and business of the Kalamazoo Wax Paper Company, manufacturer of waxed and processed papers for wrapping food products, etc., and will continue production in the same line. It it proposed to develop increased capacity in the future. Company was organized recently under State laws with capital of $15,000. Carleton W. Reade, formerly connected with the Kalamazoo Vegetable Parchment Company, Kalamazoo, is president of the new company.

Chicago, Ill.—The Celotex Corporation, 919 North Michigan avenue, manufacturer of insulating board products and kindred board specialties from sugar cane waste, has developed a new board product at its mill, consisting of a hardboard tile unit, 3/16-inch thick, designed for flooring use. The material is being made in two sizes, about 12 x 24 inches, and 24 x 48 inches, respectively, with beveled edges. The company has begun to market the new specialty and plans for large output at mill. The Celotex Corporation has completed arrangements for purchase of a block of 109,360 shares of common stock and 9496 shares of preferred stock of the Certain-Teed Products Corporation, New York, N. Y., manufacturer of insulating paper, roofing papers and other kindred products, and will be active in management of that company in future.

Buffalo, N. Y.—The Rayon Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., is arranging for curtailment of production at mills on River road, Buffalo, including staple fiber division, and plant will close down at early date, releasing about 500 workers.

Thorold, Ont.—The Ontario Paper Company, Ltd., manufacturer of newsprint, wrapping papers,

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etc., has completed plans for improvements and extensions in mill, including installation of new pulpwood handling plant, wharf facilities and power house additions. Work is estimated to cost close to $200,000, with equipment. Bids will be asked at once.

London, England—Celotex, Ltd., a subsidiary of the Celotex Corporation, 919 North Michigan avenue, Chicago, Ill., manufacturer of wall board, insulating board and allied specialties will soon begin operations at new mill at Stonebridge Park, Middlesex, vicinity of London, where finishing of plant construction is now in progress. The mill has been in course of erection for a number of months. Equipment will be installed for a rated production of about 12,000,000 square feet of hard board products and 30,000,000 square feet of insulating board per annum. New mill will give employment to a large working force and will cost about $1,250,000.

New Companies

Chicago, Ill.—The Majestic Mills Paper Company, 4635 West Fulton street, has been incorporated with capital of 210 shares of stock, no par value, to manufacture and deal in paper products of various kinds. Incorporators of new company include G. C. Carleton, R. E. Tutweiler and C. E. Atwood.

New Brunswick, N. J.—The Fibre Products Laboratories, Inc., has been incorporated with nominal capital of $2000, to manufacture and deal in fiber specialties. J. Harold Goldman, 1302 Livingston avenue, New Bruswick, is company representative.

Floral Park, N. Y.—The Beinbrink Paper Company, Inc., has been chartered with capital of $20,000, to deal in paper products of various kinds. New company is represented by Levine & Meckler, 512 Fifth avenue, New York, N. Y., attorney.

Chicago, Ill.—The Decalcomania Products Company, Inc., 33 South Clark street, has been incorporated with capital of 150 shares of stock, no par value, to manufacture and deal in decalcomanias and kindred paper products. New company will take over and succeed to the organization of same name at 2714 West Montrose street. The incorporators are F. S. Jackson, K. L. Heimlich and J. A. Griffing. Edward P. Madigan, 33 South Clark street, is company representative.

J. W. Meaker & Co. to Handle Supplies

John W. Meaker & Co. have established an office in Room 1540 of the Conway Building, 111 W. Washington street, Chicago, for the handling of paper mill supplies, including pulp, wires, felts, twine and other items of a similar nature. They have already secured several worth-while accounts and are seeking one or two other lines to add to it.

When Mr. Meaker was president of the Bates Valve Bag Corporation, before its sale to the St. Regis interests, he became quite well acquainted with all of the kraft mills of the country, and later was still more closely associated with the kraft mills of the Lake States region through his connection with the Northern Kraft Association.

The company aims to give outstanding service in the handling of its various lines and Mr. Meaker invites all of his old friends to visit him in his new office.

COOPERATE IN MUSEUM EXHIBIT

(Continued from page 67)

sociation's policy of taking a more active interest in public affairs, and in seeking information on all sides of any question of general interest.

Considerable progress in the Sales Tax protest was reported by the committee in charge, and it is highly probable at this writing that that portion of the Philadelphia Sales Tax pertaining to goods sold outside of Philadelphia will be repealed largely through the efforts of this Association and other groups of a similar nature.

On behalf of the Golf Committee it was announced that plans have been completed for the first golf tournament of the season, and this will be held at Pine Valley, N. J., on May 18th. Members are invited to bring as many guests as they care to invite. There will be a day of golf, after which the members will meet informally for dinner at Silver Lake Inn on White Horse Pike.

The Association's Buyers' Guide recently distributed, has met with such wide acclaim that it has been decided to start work immediately on the next issue of the publication, which will be distributed in January of 1939. There are not sufficient copies of the present issue available to fill the demand and an extra large supply of the new books will be made up so that there may be no shortage next year.

Entertain Boston Paper Salesmen

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 25, 1938.—More than 200 paper and twine salesmen of this city were guests of the New England Paper Merchants Association at a dinner at Ford Hall, Thursday. Donald G. Clark, comptroller and former purchasing agent of Brown & Sharpe Manufacturing Company, Providence, R. I., addressed the group on "Salesmanship from the Purchasing Agents' Angle." Mr. Clark, who is past-president of the National Association of Purchasing Agents and a speaker of note, was secured for the program by John R. Halkyard, president of the Paper Merchants Association and vice-president of the Providence Paper Company.

A motion picture on good salesmanship was shown by courtesy of the Coca Cola Bottling Company. E. L. Cummings, of Storrs & Bement Company, this city, led in the general singing. John C. Hurd, executive secretary of the Association, which includes most of the leading paper jobbers of New England, was in charge of the general arrangements.

Badger Mills to Add New Digester

[FROM OUR REGULAR CORRESPONDENT]

PESHTIGO, Wis., April 18, 1938.—Construction of a new building was started last week by the Badger Paper Mills, Inc., to house a new digester. The structure is adjacent to the pulp mill, is 46 by 46 feet in size, four stories or 106 feet high, and will be built of concrete. A 14-foot digester, 40 feet high will be installed to take care of the need for expanded facilities. John Salen and Son, Menominee, Mich., is the general contractor, and the structural steel work will be done by Vulcan Manufacturing Company, Fond du Lac, Wis. The project is under the direction of Willard Fahrenkrug, superintendent of maintenance.

PAPER TRADE JOURNAL

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Henry J. Berger
EDITOR

Ronald G. Macdonald
Editor Technical Section

Lynne M. Lamm
Washington Correspondent

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COMING EVENTS IN THE PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry— Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILLS SUPERINTENDENTS ASSOCIATION, Annual meeting, Royal York Hotel, Toronto, Ont., June 22-24.

THE WAGNER LABOR BILL

The pending Wagner Bill, S.3390, is one of the most ambitious attempts of the Administration to secure Federal control of all employment relations, excepting those included within the Railway Labor Act. The enactment of this measure would have a harmful and far-reaching effect on all industry and trade and is opposed by the Chamber of Commerce of the United States and by the National Association of Manufacturers. The bill is so phrased that it would give the National Labor Board authority over all persons who sell or borrow from the Federal Government.

In its opposition to the extension of the National Labor Relations Board, the National Association of Manufacturers asked Congress on April 7 to amend the Labor Relations Act to lessen rather than to increase labor disputes and afford more adequate protection for the public. In presenting the views of the Association, L. N. Bent, vice-chairman, said in part: "At the present time everything possible should be done to remove the uncertainties and difficulties of doing business. Only in this way can increasing unemployment be checked. This bill, if passed, will prove a very decided additional handicap to business and will be a decided factor in prolonging the present depression."

In presenting a request for an amendment that would aid business, James A. Emery, general counsel for the Association pointed out that, "in the minds of business men a contract is a precise outline of the conditions of agreement, and the insertion of a stipulation in contracts that contractors would abide by every future ruling of the Labor Board would inject additional uncertainties". Another disturbing effect of the Wagner Bill, Mr. Emery pointed out, would be that any borrower from a Federal Reserve Bank, Farm Loan Bank, Community Credit Corporation or any agency of the government, would have to accept the Labor Board's rulings as to classification of employees. Amendments, he said, should move in a far different direction.

The National Association of Manufacturers in a public statement said in part: "Manufacturers believe the industry of this nation is as dependent upon mutual good will and fair play in employment relations as upon the efficiency of labor or the skill of management. But this is not a condition of mind and will that can be compelled by private demand or public compulsion. It must be won by mutual understanding and reciprocal justice.

"That the operation of the National Labor Act is not lessening but multiplying disputes is a fact witnessed by the Department of Labor. It reports a larger number of strikes in 1937 than in any previous year. The very purpose of the legislation to minimize threatened interruption of production and service is failing, we believe, because it is not in accordance with the primary declaration of the President as to the proper attitude of Government in the field of employment relations that it is not the business of Government 'to favor any particular organization', but it is the business of Government to see that there is 'no coercion from any source'."

The sweeping character of the Wagner Bill is plainly seen in the definition of the word "person" which includes not only private individuals, partnerships, associations and corporations, but all the boards, commissions or other instrumentalities of a State or a city or other political subdivisions. Within "agency" of the United States is included all its departments, boards and commissions, the Federal Reserve System and lending agencies, like the R.F.C., the Federal Land Banks etc. All are instrumentalities of the United States. This means that every loan or grant made to a farmer and to a business man by such agency is included in the bill. Every State, city, county or local public body that receives or shares in any Federal loan, agrees on behalf of itself and every public employee within its control, that it accepts the National Labor Board as the arbiter of its employment relations.

In presenting the request of the Chamber of Commerce of the United States for an amendment favorable to business, John W. O'Leary, chairman of the Chamber, said in part: "The proposed bill will reach

small business men everywhere, however local their activities—as borrowers from any banks, state or national, in the Federal Reserve System. It will subject to double penalties employers already subject to the National Labor Relations Act—through the forfeitures contemplated by the bill in addition to the penalties, often severe, provided by the Act, such as back pay in large amounts.

"It will materially lessen the number of employers who can bid on government contracts, or supply materials and equipment for contractors, with increases in costs to the government in supplying its needs. It will promote unfair government competition with private enterprises; for the bill would apply widely to employers with the conspicuous exception of the government itself, its agencies and its corporations engaging in activities directly competitive with private citizens."

Hungary's Newsprint Production

Budapest, April 6, 1938.

Editor, PAPER TRADE JOURNAL:

According to the figures in the article entitled World Makes Newsprint Record In 1937, in the issue of the PAPER TRADE JOURNAL of March 10, newsprint was not produced in Hungary until in 1937.

However, our mill started newsprint production as early as 1933. There is no other mill in Hungary manufacturing this sort of paper. Our output of newsprint for political daily newspapers was 3,938 short tons in 1934; 4,950 short tons in 1935; 5,016 short tons in 1936 and 4,100 short tons in 1937.

The quantities delivered for weekly, monthly, etc., periodicals are not included in the foregoing figures. These amount to a further 1,000-1,300 short tons a year.

The yearly consumption of Hungary is 22,000 short tons. Our mill could easily supply this quantity, but owing to the different commercial conventions with foreign states, we must not cover more than 25 per cent approximately of the home demand.

The price of the home-made newsprint always follows the fluctuation of the world market prices, since there is no import duty in force for newsprint.

Yours faithfully,

NEMÉNYI BROTHERS PAPER MILL CO., LTD.

Paper Mills Damaged by Turbid Water

[FROM OUR REGULAR CORRESPONDENT]

FULTON, N. Y., April 25, 1938—A public hearing was held here last week before an army engineering board at which warning was given by witnesses that only federal payments of nearly $200,000 in claims for damage to Fulton and Phoenix paper mills by turbid water during dredging of the Barge Canal might avert possible closing of some plants and extensive loss of employment. The government appropriated $27,000,000 for canal work betwen Oswego and the Hudson River with a provision that none of the money was to be paid for claims, the state agreeing to be responsible. It is said that the state has adopted an unfavorable attitude towards the claims. It was further argued that the project was purely a federal job using money appropriated by the government.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association

COMPARATIVE MONTHLY SUMMARIES

Months	1938(c)	1937(c)	1936	1935	1934
January	64.5%	90.3%	76.1%	65.8%	.....
February	68.7%	90.1%	77.9%	70.0%	.....
March	69.5%	90.3%	76.0%	70.5%	.....
April	.....	92.1%	82.3%	70.0%	.....
May	.....	90.6%	81.6%	69.4%	.....
June	.....	87.3%	80.7%	72.3%	.....
July	.....	81.8%	77.3%	64.9%	.....
August	.....	82.9%	81.5%	70.9%	.....
September	.....	78.6%	8 .5%	71.9%	58.2%
October	.....	73.5%	87.6%	75.6%	64.7%
November	.....	61.9%	88.0%	75.3%	61.7%
December	.....	54.5%	85.9%	71.2%	59.6%
Year Average	.....	80.6%	81.3%	70.5%	.....
First 15 weeks	67.5%	90.6%	77.6%	68.7%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1938		CORRESPONDING WEEKS, 1937	
*March 12	70.0%		
*March 19	69.2%	March 13	90.6%
*March 26	68.3%	March 20	90.7%
*April 2	72.3%	March 27	91.1%
*April 9	67.3%	April 3	89.7%
*April 16	67.8%	April 10	92.4%
		April 17	93.3%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks					
Ratio Limits	Mar. 12, 1938	Mar. 19, 1938	Mar. 26, 1938	Apr. 2, 1938	Apr. 9, 1938	Apr. 16, 1938
0% to 50%	80	100	96	91	96	62
51% to 100%	217	202	204	206	198	154
Total Mills Reporting	297	302	300	297	294	216

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported by individual companies.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

Mos.	1938 (e)	1937 (e)	1936	1935	Mos.	1938 (e)	1937 (e)	1936	1935
Jan.	55%	80%	61%	61%	July	67%	69%	59%	
Feb.	61%	86%	67%	67%	Aug.	74%	75%	65%	
Mar.	....	87%	68%	67%	Sept.	70%	76%	69%	
Apr.	....	89%	70%	61%	Oct.	66%	82%	76%	
May	....	86%	68%	61%	Nov.	56%	79%	70%	
June	....	75%	68%	65%	Dec.	46%	74%	60%	

Week end. Mar. 12, 1938—61%
Week end. Mar. 19, 1938—60%
Week end. Mar. 26, 1938—62%
Week end. Apr. 2, 1938—61%
Week end. Apr. 9, 1938—58%
Week end. Apri. 16, 1938—58%

(e) Basic figures revised to include new members of the National Paperboard Assn.

Log Exports from B. C. to Japan

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 13, 1938—Log exports from British Columbia to Japan in 1937 amounted to 27,628 M board feet, according to a report to the Department of Commerce from the American Consul General, Vancouver. Inasmuch as it has been reported that Japan plans to use British Columbia logs in large new pulp manufacturing enterprises and that Japanese interests have acquired certain large tracts of standing timber in British Columbia, numerous protests have been made by private sources suggesting an export tax or an outright embargo on such exports. The Provincial Government, however, takes the position that it has no control over the export of logs from Crown-granted timber holdings, and the Minister of Lands has therefore announced that the question of controlling log exports will be discussed with Dominion Forestry officials this spring.

Log exports from ordinary timber licenses in British Columbia may only be made when special permits are issued for this purpose.

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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Chlorine as a Deodorant in Sulphate Paper Pulp Manufacture

By W. O. Gordon [1] and E. E. Creitz [2]

Abstract

(a) Chlorine is effective in neutralizing the odor from sulphate pulp mills.

(b) Approximately 25 pounds of chlorine per ton of pulp produced is necessary to effect odor elimination.

(c) The estimation of the added cost due to the use of chlorine involves not only that of the chlorine, but that of the necessary equipment, the change in plant design, and a maintenance problem due to corrosion. It is without reason to assume that a pulp manufacturer can absorb this added cost and it is not justified except in peculiar instances. One such would be in event a mill were declared a nuisance and forced to suspend operations.

(d) Preliminary results indicate that alum and ferrous sulphate have a clarifying action on mill effluent darkened by black liquor. Weak wash water from the diffusers is one such source. Since chlorine is so reactive with solutions containing black liquor, it may be found that through a floc the amount of chlorine absorbed by the mill effluent will be decreased.

The highly objectionable odor peculiar to sulphate pulp manufacture has incited the interest of pulp manufacturers and of communities adjacent to kraft mills in the possibilities of odor control or elimination. The occasion for this study was the annoyance due to such a mill located near Tuscaloosa, Ala., wherein is located the University of Alabama, the U. S. Veterans' Hospital and the Alabama State Hospital.

The National Bureau of Standards, in cooperation with the University of Alabama and the Gulf States Paper Corporation, established a laboratory at the University to study the sulphate process, looking forward to methods of odor elimination. This paper is a report of the results obtained through that study.

The procedure of making kraft pulp involves:

(1) The digestion of pine chips with cooking liquor under steam pressure of 100 to 125 pounds.

(2) Blowing the cooked or pulped chips into a diffuser to be washed free from spent cooking liquor.

(3) Screening the pulp before going to the machine.

(4) Concentration of the spent black liquor and the incineration of all organic matter in the recovery furnace.

At the same time that the concentrated black liquor is sprayed into the recovery furnace, sodium sulphate is added slowly. Sodium sulphate is reduced to sodium sulphide and the solution of the fused melt of sodium carbonate and sulphide is treated with lime to regenerate sodium hydroxide. After proper adjustment of concentration this white liquor is used for cooking other chips. Sulphate pulp derives its name from this use of sodium sulphate. Sodium sulphide functions as a solvent for resins and, through hydrolysis, after the partial depletion of the sodium hydroxide, serves as a reservoir of alkali and maintains its concentration.

Sources of Mercaptans

The repulsive odor incident to sulphate pulp production has been found to be due to methyl and ethyl mercaptans and sulphides. The points in the process of manufacture at which these products are released to the atmosphere have been determined to be (1) during the digestion, (2) in the release of the pressure in discharging the digesters, and (3) in the condensate from the evaporators. This article deals with the measurement of the amounts of mercaptans and sulphides generated, and suggests chemical means by which these may be neutralized.

During the digestion, built-up gas pressure in the digester is relieved until the gauge pressure corresponds to the actual cooking temperature. Turpentine is condensed from the relief gases and the noncondensible gases are vented to the atmosphere. In discharging the digester, the reduction of pressure to that of the atmosphere is the second source of mercaptans, etc. The condensate from the evaporation of the black liquor which carries mercaptans and organic sulphides in solution is a third source of odor.

A fourth and prolific source of odor is occasional and accidental, and is due to the faulty control of the concentration of solids in the evaporated spent liquor before being sprayed into the recovery fur-

[1] Formerly National Bureau of Standards, now U. S. Naval Gun Factory.

[2] Formerly National Bureau of Standards, now U. S. Bureau of Mines.

nace. If the density and viscosity of the concentrated liquor is low, the increased proportion of water and volume of liquor may so reduce the temperature in the furnace that destructive distillation results and the mercaptans pass out of the stack without being burned.

Existing Patents for Odor Correction

Numerous patents are available for correcting the odor emanating from a sulphate pulp mill. For the most part, they consist of condensing the relief gases from the digester, after separating the entrained liquor, and conducting the non-condensible gases underneath the boiler grates or to the recovery furnace, hoping that combustion will eliminate them. In other instances, the non-condensible gases which are reputed to be the volatile compounds of sulphur, such as mercaptans, alkyl sulphides, etc., are maintained in contact with black liquor (or perhaps bubbled through it), since black liquor has some solvent action on these substances. The escape from the black liquor solution invariably leads to the boilers. Unfortunately, consideration has been given only to the digester relief gases, since it is generally assumed that mercaptans, being quite volatile, are more or less completely driven off in the gas-off from the digesters.

The purpose and intent of digester relief is different in sulphate practice from sulphite procedure, although conducted similarly. With the latter, except at the first part of the cook when the pressure in the digester becomes excessive due to the heated sulphur dioxide solution, the digester relief is necessary to maintain circulation of the cooking liquor during digestion in order to produce uniformly pulped chips. Uniform pulping is essential in producing white paper, the ultimate end in the sulphite method. During the long cooking period of the sulphite process, circulation by means of digester relief is sufficient to insure uniform cooking liquor. However, in making sulphate cooks — especially kraft cooks — perfect circulation is not so essential since the tendency is toward undercooked pulp. In plants that recover turpentine from the gas-off, the relief is more or less uniform throughout the cook and this promotes little circulation. In such cases, pump circulation is required because of the short cooking cycle. Frequently the volume of water (as steam, condensed) collected during digester relief amounts to as much as 15 per cent of that contained in the cooking liquor. This is necessary in order to obtain the maximum yield of turpentine.

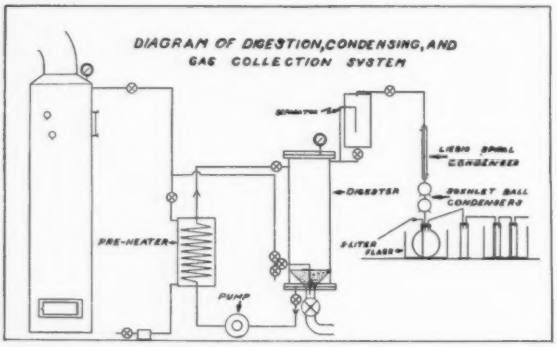


FIG. 1

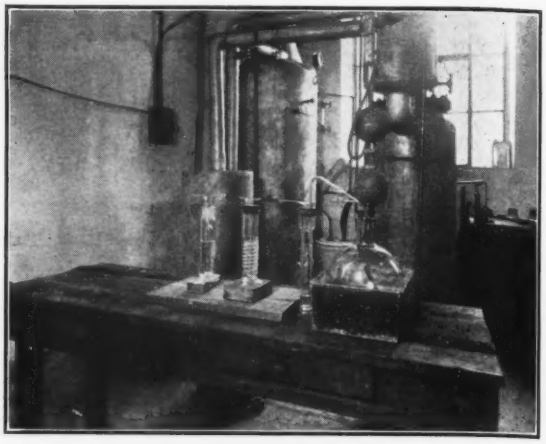


FIG. 2

Photograph showing the condensing and gas absorption arrangement, consisting of the Liebig spiral condenser, the two Soxhlet ball condensers, the balloon flask receiver, and the gas washing bottles for the absorption of the non-condensible gases.

One might think that this excessive relief would be sufficient to expel all the volatile mercaptans from the digester, and that their disposal would not be difficult.

Experimental

A small pulping unit was designed having a digester capacity of 2.5 cu. ft. or approximately 25 pounds of oven-dry chips. It was possible to heat the cooking liquor in the digester either by direct (live) steam or indirectly, by circulating the cooking liquor, using a centrifugal pump, through a coil housed in a steam chest. The condensible portion of the gas-off was condensed by passing through a cooling coil, while the non-condensible gas collected over water in a gas-holder, or dissolved in alcohol contained in gas washing bottles. The usual difficulty was experienced in effecting a design that insured sufficient condensing area without withholding in the equipment itself a volume of the gas that could not be collected. The diagram (Fig. 1) outlines the final design used in studying the non-condensible portion of the gas. Fig. 2 pictures the condensing arrangement while subsequent photographs depict the digestion equipment.

A typical experimental run used 35.0 pounds of chips containing 27.21 per cent of moisture, 25.476 pounds of oven-dry matter. The cooking liquor, consisting of 6.0 pounds of sodium hydroxide (98 per cent, technical, flake) and 3.0 pounds of sodium sulphide (60 per cent, fused, technical) dissolved in 120 pounds of water, was added to the chips contained in the digester. The circulation was started through the pre-heater and the liquor brought to 169 deg. C., equivalent to 100 pounds steam pressure and requiring 30 to 35 minutes. A cooking period of three hours was adopted generally, during which time the digester was relieved more or less continually. Indirect heating by circulating through the pre-heater was employed generally to preclude dilution of the cooking liquor by steam condensation.

The relief gas was passed through the Liebig spiral and the two Soxhlet ball condensers, the condensate collecting in the balloon flask receiver. The turpentine separated on the surface of the con-

densate and was withdrawn and measured. The non-condensible gases were dissolved in the alcohol contained in the gas washing bottles.

Qualitative examination of the alcoholic solution of the gases showed a pronounced reaction with aqueous and alcoholic mercuric chloride, acid and alkaline potassium permanganate, sodium plumbite solution, and standard iodine but did not react with cadium chloride acidified with hydrochloric acid. These reactions, together with the characteristic odor, were sufficient to identify mercaptans and alkyl sulphides. The absence of any reaction with 5 per cent cadmium chloride in alcohol containing 1 per cent concentrated HCl demonstrated that no hydrogen sulphide was contained in the gas. It has been shown previously that hydrogen sulphide will precipitate this mixture and constitutes a method of separation of hydrogen sulphide from mercaptans and alkyl sulphides.

Mercaptans can be accurately titrated with standard iodine. Accordingly, this reaction was used to determine the sulphur bodies in the gas. Since there is no known rapid method for the separation and estimation of mercaptans, alkyl sulphides, etc., it was assumed that the amounts of iodine consumed by the gases evolved from the series of cooks were comparative and of value.

Titration of the alcoholic solutions of the gases with 0.1103 normal iodine gave the following results:

Cook No. 50 required 24.25 cc.
Cook No. 51 required 21.50 cc.
Cook No. 55 required 17.25 cc.
Cook No. 56 required 27.25 cc.

The average, 22.56 cc., calculated to the chlorine equivalent consumed only 0.080 grams of chlorine.

Chlorine at once seemed logical as a reagent capable of neutralizing or correcting the odor emanating from a sulphate cook. Certainly chlorine is highly reactive with mercaptans, and the ease of manipulation commends it. In order to effect the direct reaction of the generated gases with chlorine, the condensing and collection part of the equipment was rearranged. Figs. 3, 4 and 5 pictures this equipment. The gas-off was condensed in a 1-inch pipe coil, 35 feet long, and cooled in a tank of running water. The condensate (including the turpentine layer) collected in a 5-liter balloon flask which could be emptied with a syphon without being disconnected from the coil. The non-condensible gases were led directly into a spray chamber, which was actually a commercial 40-gallon hot water tank containing

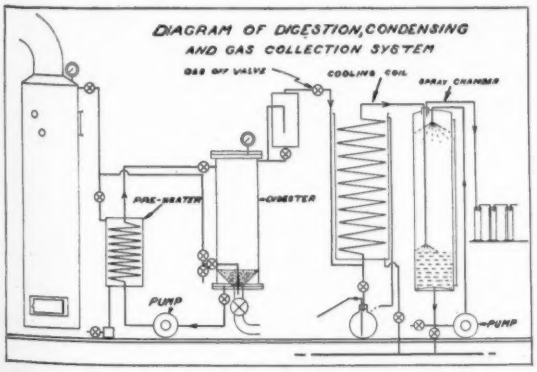


FIG. 3

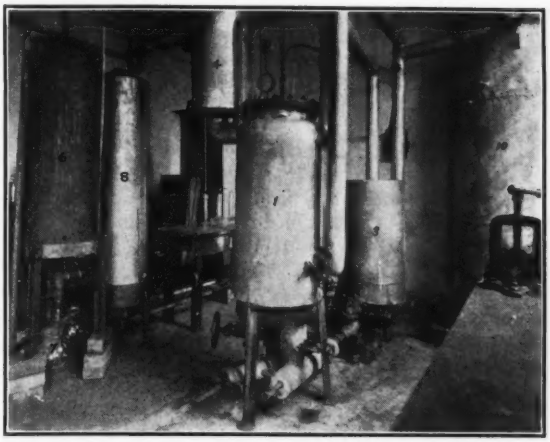


FIG. 4

1—DIGESTER, capacity 50 pounds of chips—3 inch discharge with gate valve. ½ inch direct steam line. Conical strainer in bottom with 3/16 inch perforations through which the cooking liquor is circulated by direct connected 2—CENTRIFUGAL PUMP, through 3—PREHEATER, and back into the top of the digester the preheater consists of 15 feet of 1 inch pipe coil, housed in a steam chest. 4—TRAP SEPARATOR for the separation of gas and cooking liquor on relieving the digester through 5—GAS-OFF VALVE. 6—COOLING COIL, 35 feet 1¼ inch pipe coil, water cooled, to condense steam and condensible gases. Condensate collects in 7—RECEIVER, a 5-liter balloon flask, where the turpentine separates, and from which the fractions of condensate may be withdrawn. The non-condensible gases pass into the spray in the 8—SPRAY CHAMBER, a commercial hot water tank, containing hypochlorite solution, circulated from the bottom of the tank through a spray nozzle into the top by a 9—ROTARY PUMP, direct connected and motor driven. 10—STEAM BOILER, 7.5 hp., 125 pounds steam pressure.

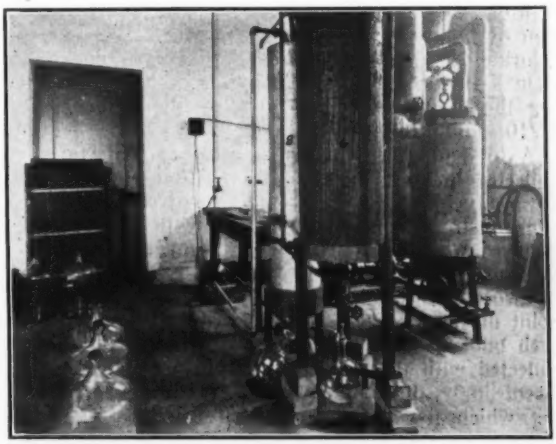


FIG. 5

The usual procedure is to charge the digester with a weighed quantity of chips, close, and pump in the required amount of cooking liquor of known composition. The circulation is started and the temperature of the liquor is brought to 169 deg. C., which corresponds to 100 pounds steam pressure. The cooking is completed by indirect steam with the continuance of circulation, or by direct steam introduced at the lowest within the digester. Through the gas-off valve, the digester is relieved and at the end of the cook, the pressure is released through the cooling coil in order to recover any gas in solution under pressure. The pulp is washed by circulating hot water before discharging.

twenty liters of a hypochlorite solution of known active chlorine content. From the bottom of the tank, this solution was circulated by means of a high pressure rotary pump through a spray nozzle within the top of the tank. Through this spray the gas driven off during the cook must travel, permitting any reaction with the chlorine. Two gas washing bottles containing alcohol were added in series as a safety. Subsequent examination of the alcohol in the gas washing bottles showed the absence of mer-

captans, etc., showing that the reaction of the chlorine on the gases evolved was completely effective.

This design effected the most complete condensation of the gas-off and permitted the replacement of the gas in the coil by means of water, the volume of which is considerable. It enables the replacement of the residual gas in the spray tank through the gas washing bottles in establishing the effectiveness of the chlorine reaction. The area of drainage of the condensate is reduced to a minimum and permits the easy collection of the condensate and the turpentine. The overflow of the cooling coil tank was distributed over the surface of the balloon flask receiver, and this facilitated the condensation and the further cooling of the condensate.

The results from four cooks in which the non-condensible gases were directed into the hypochlorite spray were fairly concordant. The amounts of chlorine consumed were 0.89, 1.82, 1.09 and 1.37 grams, respectively. The average is 1.29 grams and is to be compared with the figure 0.080 referred to above, and which was obtained by titrating the alcoholic solution of the gases directly with standard iodine and calculated as chlorine consumed. The result, 0.080 was also the average obtained from four experimental cooks.

The use of chlorine in neutralizing the odor of the non-condensible gases was highly effective, and since the condensed fraction of the gas-off was so far from being pleasant, it seemed pertinent to study the extent of the reaction of chlorine on this condensate. One liter portions, after removing the separated turpentine layer, were treated with a hypochlorite solution of known active chlorine content. The excess chlorine was determined by adding to an aliquot part a small amount of potassium iodide solution, acidifying the dilute HCl, and titrating the iodine with N/10 sodium thiosulphate.

A total of 11.25 liters of gas-off condensate was collected in cook No. 67, and 10 liters in No. 68. Respectively, 8.78 and 10.71 grams of chlorine were consumed. Compare this figure with 1.29 grams (above) which is the chlorine consumed by the non-condensible gas in the spray chamber.

Two experiments were made to determine at what point during the cook there ceased to be driven off such odorous compounds as were contained in and collected with the condensate from a regular cook. Accordingly, the cooking period was prolonged, during which five (or six) 5-liter fractions of condensate were collected. The grams of chlorine consumed are calculated for each 5-liter fraction:

	1st	2nd	3rd	4th	5th	6th	
No. 69.....	...	22.68	11.72	15.67	18.59	16.98	grams.
No. 70.....	2.38	3.70	8.78	7.60	10.69	....	grams.

In No. 69, all fractions of condensate were dark due to entrained cooking liquor, and the figures for the chlorine consumption are quite high as against No. 70 in which the condensate was clear and considered representative. The figures for No. 69 are submitted only to show an outside condition, and it was observed that the action of chlorine produced a heavy precipitate in all fractions and that the characteristic odor reappeared after standing over night. It is quite apparent from No. 70 that, as the cooking is prolonged beyond the regular cooking period, more and more substances reactive with chlorine are generated and found in the condensate fractions.

It was observed in commercial practice that the evaporator condensate furnished a prolific source of odor. In order to determine its extent by measuring it with chlorine consumption, duplicate cooks were made in the usual way. After completion of the cooks, the spent liquor was drawn off the pulp, and the pulp washed with three portions of hot water. The spent liquor plus the wash water was made up to 50 liters, the amount of water used in the original cook. This constitutes "black liquor." The black liquor was partially evaporated and five 5-liter fractions of clear condensate were collected. The grams of chlorine consumed by each fraction at the end of three hours were:

	1st	2nd	3rd	4th	5th	
No. 71.....	9.53	11.04	10.40	9.59	16.55	grams
No. 72.....	8.24	11.08	10.57	9.20	19.55	grams

Upon standing twenty-four hours, the chlorine consumption had increased:

	1st	2nd	3rd	4th	5th	
No. 71.....	12.55	13.43	11.24	11.87	18.72	grams
No. 72.....	10.57	13.06	13.31	11.38	21.50	grams

Aliquot portions of the condensate were titrated with standard iodine and calculated as chlorine consumed and based on 5-liter fractions comparable with the above:

	1st	2nd	3rd	4th	5th	
No. 71.....	0.137	0.264	0.254	0.448	1.574	grams
No. 72.....	0.996	0.929	0.938	0.820	2.30	grams

The equipment necessary for the evaporation of the black liquor to dryness or even to 75 per cent solids was not available, and of course the chlorine consuming substances remaining in the black liquor after being partially evaporated could not be determined directly. However, if, after partial evaporation of the black liquor, the volume is made up to 50 liters — the original volume — and again evaporated, certainly the condensate would contain additional chlorine consuming substances.

Accordingly, in Nos. 71 and 72 (above), after collecting four 5-liter fractions of condensate, the volume of the black liquor was made up to 50 liters and six additional 5-liter fractions were collected. The chlorine consumed by each fraction was: 6.68, 4.88, 4.30, 6.49, 7.98 and 5.28 grams, respectively. Again making the volume up to 50 liters and evaporating, four 5-liter fractions consumed 4.00, 3.02, 2.42 and 3.28 grams of chlorine.

In the commercial operation of a recovery furnace of the Wagner type, the concentrated black liquor containing 70 - 75 per cent solids is sprayed into the furnace through a rifled tube. At this concentration the heat of the furnace is sufficient to complete the evaporation and to burn all organic matter. Of course the liquor entering the furnace carries odorous substances.

Black liquor contains 20 - 25 per cent solids, and to reduce this to 70 per cent would require the removal or evaporation of two-thirds of the water, and of course two-thirds of the substances that consume chlorine, approximately. Simple calculations show that, by partial evaporation of the liquor as outlined above, the total chlorine reducing substances would be driven off before the end of the second stage. That is, if 50 liters of black liquor is concentrated to 30 liters, and, after being made up to a volume of 50 liters, is again reduced to half its volume, then it may be safely assumed that approximately 70 per cent of the total chlorine absorbing substances has been driven off and is contained in the condensate.

The calculated total quantity of chlorine consumed

would be that for the several portions added together. The gas-off condensate consumed 9.75 grams of chlorine. The first four 5-liter fractions of condensate consumed on the average 9.46, 10.68, 9.75 and 10.72 grams, or 40.61 grams. The five 5-liter fractions in the second stage of the evaporation consumed 6.68, 4.88, 4.30 and 7.98 grams or 30.33 grams. The grand total of chlorine consumed is 80.69 grams. This is based on the average of ten cooks, producing on the average 10.32 pounds of pulp for an average yield of 40.5 per cent. This is equivalent to 34.3 pounds of chlorine per ton of pulp.

As has been shown above, the condensate fractions treated with an excess of chlorine gradually absorb more chlorine, even after twenty-four hours contact. It is true that a slight excess of chlorine at the end of twenty-four hours is not sufficient to remove all objectionable odor and especially so if the condensate contains any entrained liquor or black liquor. The odor of the chlorine treated portion, while not pleasant, is not one characteristic of mercaptans. Certainly the action of chlorine on mercaptans is rapid, and the speed of this reaction is readily apparent by titration of residual free chloride at frequent intervals. A curve prepared by plotting the chlorine consumed against time indicates the rapid consumption of chlorine during the first few minutes of contact, and, since this reaction is so vigorous, a point on the curve corresponding to zero minutes of contact must indicate closely the amount of chlorine consumed by the mercaptans and organic sulphides. From this curve the ratio of chlorine consumed in zero minutes to that absorbed at the end of two and one-half hours is as 2.70 is to 4.24 or 63.7 per cent. The average of three other such curves is 63.2 per cent; that is, 63.2 per cent of the total chlorine consumed is used to oxidize the mercaptans, etc. Calculation of the chlorine requisite to dispose of the mercaptans, etc., and therefore the odor, would indicate 21.7 pounds of chlorine per ton of pulp. (63.2 per cent of 34.3 pounds.)

According to Bergstrom and Fagerlind *(1)* the digester blow-off gases contain methyl mercaptan, methyl sulphide, methyl disulphide, methyl alcohol, hydrogen and ammonium sulphides, and of course turpentine. Their experiments dealt with the relief gases from cooks at 150 pounds pressure with yields averaging 40 per cent of pulp. Actually, their interest was in the production of methyl alcohol and not in kraft pulp.

Klason and Segerfeld *(2)* estimate the formation of as much as 200 grams of mercaptans per ton of pulp produced. The bomb digester that was used had a capacity of 400 grams of oven-dry chips, and the content of sodium hydroxide in the cooking liquor varied from 12 to 25 per cent while that of sodium sulphide varied between 2.5 and 4 per cent. They passed the non-condensible gases through mercuric cyanide, weighed the resulting mercaptide and sulphide, and dissolved out the mercaptide with nitric acid. Their estimate of mercaptan formation was between 40 and 200 grams per ton of pulp produced.

Moderate oxidation of mercaptans produces disulphides *(3)*, and mercaptans may be titrated using standard iodine according to this reaction:

$$2\ CH_3SH + I_2 = (CH_3)_2S_2 + 2\ HI$$

Bromine reacts similarly.

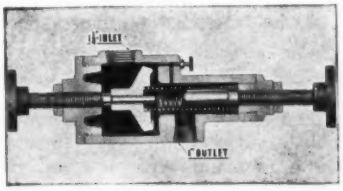
Calculation of the iodine titration (page 7) shows the formation of 230 grams of methyl mercaptan per ton of pulp, while from the chlorine consumed 340 grams of methyl mercaptan appear to have been generated. Both figures are based on cooks closely simulating commercial practice and both assume that a disulphide is the end product in the oxidation of a mercaptan by iodine or chlorine. In any attempt to account for the disparity of the chlorine and iodine figures, it is logical to assume that oxidation of mercaptans by chlorine proceeds, in part, beyond that of disulphide formation.

Literature Cited

(1) Papier-Fabr., 7; 7, 27, 78, 104, 129. (1909).
(2) Papier-Fabr., 9; 1093-1099. (1911).
(3) B., 39; 378.

Automatic Shut-Off Valve

An automatic shut-off valve to be placed in the supply line above flexible hose used to convey compressed air, steam, gas, or fluids under pressure, that immediately shuts off the supply when there is a break in the hose or it becomes disconnected is now being manufactured by D. J. Murray Manufacturing Company, Wausau, Wis., and sold under the trade name "Murray-Lorge". A cut-away view of the valve is shown here. The valve operates on the principle of equalization—that as long as the pressure at the inlet and the outlet are nearly, or exactly the same, the plunger is maintained in an open position by means of a spring, permitting the air, steam, or other supply to flow around it in a normal manner. The plunger may be adjusted to automatically shut off the flow at any desired pressure at the inlet, or size of break at or below the outlet. This valve is designed as a safety appliance to promote the efficient use of tools wherever flexible hose is used; it is compactly built and may be used indefinitely without attention.



TAPPI Kalamazoo Valley section to Meet

The next meeting of the Kalamazoo Valley Section of the Technical Association of the Pulp and Paper Industry will hold its next meeting on May 5 at the Park American Hotel, Kalamazoo, Mich.

Printing Presses and Printing Methods will be the subject of discussion and representatives from several leading press manufacturers will be present. It is planned to consider rotary, offset and letter presses. All who are interested are welcome.

Ralph M. Beckwith Goes to Fitchburg

MINNEAPOLIS, Minn., April 25, 1938.—Ralph M. Beckwith announces his resignation as vice-president and general manager of the Minneapolis Paper Company to accept a position as a vice-president of the Crocker, Burbank and Company, association paper manufacturers of Fitchburg, Mass. The Minneapolis Paper Company announces that Herman C. Rogers has been appointed as its general manager.

Economic and Technical Aspects of Wood Pulp as a World Commodity *

By Robert B. Wolf [1]

Oliver M. Porter, Secretary of the U. S. Pulp Producers Association, and I spent several months in Europe last summer. We had as our objective the establishment of relations with the European pulp producers which would make possible the exchange of current statistical information between Europe and America, the thought being that having such information we could at all times more intelligently evaluate the basic economic aspects of the world pulp industry.

Speaking as a pulp manufacturer, I also had the feeling that the compilation of such information by our Association would be beneficial not only to the producers of pulp in the United States but also to the consumers of pulp.

Before our trip was over we came to the conclusion that a monthly exchange of statistics covering production, stocks, consumption, and forward commitments of basic grades and kinds of wood pulp would not only be beneficial to the American pulp and paper industry but would also be beneficial to the industry throughout the world.

Our trip took us to England, France, Germany, Russia, Finland, Sweden, and Norway, most of the time being spent in the last three named countries. Wherever we went we were cordially received, and the response to our suggestions that we exchange our American statistics for similar statistical information compiled in Europe was most gratifying. No doubt the fact that we were not asking to "swop sight-on-seen", but that Mr. Porter prefaced his request for exchange by first giving his carefully prepared second edition of "World Wood Pulp Statistics", helped materially. This compilation contains all of the obtainable essential data on this basic industry.

I am pleased to report that the U. S. Pulp Producers Association is now arranging for a monthly exchange with the pulp associations of all the principal pulp producing countries of Europe, these countries already having agreed to such exchange. The importance to the United States in bringing about this exchange can be judged when it is recognized that the United States is the largest consumer, producer and importer of wood pulp in the world. In addition to this, it should be noted that there is no duty on wood pulp brought into the United States, and that pulp is generally on the free lists of all the principal paper making countries of the world.

The following figures as of *1936* are interesting:

1. The World production of all grades of wood pulp was 23,000,000 tons
2. U. S. production of all grades of wood pulp was.... 5,700,000 tons
3. U. S. consumption of all grades of wood pulp was.. 7,800,000 tons
4. U. S. imports of all grades of wood pulp was..... 2,300,000 tons
5. U. S. export of all grades of wood pulp was..... 200,000 tons

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 21-24, 1938.

[1] Member TAPPI, General Manager, Pulp Division, Weyerhaeuser Timber Company, Longview, Wash.

The above figures include groundwood pulps. The corresponding *1936* figures for chemical pulps alone were as follows:

	Sulphite	Sulphate	Soda	Total
1. World production of all chemical pulps	Not available			
2. U. S. production of all chemical pulps	1,822,000	1,795,000	558,000	4,175,000
3. U. S. consumption of all chemical pulps	2,933,000	2,533,000	566,000	6,032,000
4. U. S. imports of all chemical pulps	1,299,000	738,000	13,000	2,050,000
5. U. S. exports of all chemical pulps	187,000	0	5,000	192,000

You will note that World figures on chemical pulps alone are not obtainable. At present these figures can be secured only from government reports, and segregation by types and grades is generally not made. Furthermore, these figures are usually a year old, so the importance of arranging for a current up-to-date reporting is easily recognized.

Additional Tons of Plant

A discussion of the world chemical pulp industry, however, would not be complete without mentioning the fact that the following *additional* tons of plant capacity were added (and are building) during the years 1936, 1937 and 1938. Figures are for the principal producing countries from which information is obtainable.

	1936	1937	1938	3 year total
Sulphite—World total.....	108,000	530,000	180,000	818,000
Sulphate—World total.....	328,000	1,284,000	521,000	2,133,000
Total World chemical pulp..	436,000	1,814,000	701,000	2,951,000
Sulphite—U. S. total.....	92,000	254,000	57,000	403,000
Sulphate—U. S. total.....	235,000	1,012,000	282,000	1,529,000
Total U. S. chemical pulp..	327,000	1,266,000	339,000	1,932,000

Percentage Increases in U. S.

The totals represent percentage increases in U. S. productive capacity as related to *1936* capacity as follows:

Sulphite	20 per cent
Sulphate	92 per cent
Total chemical pulp	52 per cent

As the normal increase in U. S. production during the previous 11 years has been approximately 12 per cent for sulphite, and 260 per cent for sulphate, it can be seen how necessary it is that comprehensive world statistics be maintained in order to assist both pulp and paper producers in minimizing the violent economic maladjustments which have occurred in the past.

It should be also noted that in 1936 44 per cent of all sulphite pulp consumed in the United States was imported, and in 1936 29 per cent of all sulphate pulp consumed in the United States was imported.

Comprehensive statistical information made available to the entire pulp and paper industry in all the principal pulp consuming countries would have exploded the idea of a world shortage of pulp that caused the recent panicky over-buying—buying that

resulted in forcing pulp prices to unnecessarily high levels and the building of far more productive capacity than was required to take care of the normal increase in paper consumption.

Indeed it seems not unlikely that the normal increase in production required would have been obtained from the technical improvements in manufacturing methods by means of which yields per cook have been increased and cooking time has been shortened. I refer to the use of circulating systems and the use of cooking liquors of greater concentration.

European Cooperation

It is not the desire of the U. S. Pulp Producers Association only to become a clearing house for information pertaining to the economic aspects of the world pulp industry, but also to assist in making contacts through which technical subjects can be exchanged.

The example of Finland can well be emulated. In this interesting country the pulp producers are organized into what it known as the Finnish Cellulose Union. All Finnish mills (with the exception of one owned by Waldhof of Germany) are members. The Union not only acts as sales agent for all wood pulp but also maintains a central laboratory in Helsinki where all pulps are tested, and through which technical information is cleared for the benefit of the entire industry. Pulp manufacturers visit one another's mills freely, and so far as we could see no one had any "secrets". Visitors from abroad are shown about with the utmost freedom.

This free exchange of ideas saves much laborious duplication of effort and undoubtedly accounts for the rapid progress in the art of pulp making in Finland.

As a technical operator I strongly recommend that our managers and technicians go abroad more frequently. It would pay good "dividends" in more ways than one.

There is also much of interest to see in Sweden and Norway, and while the exchange of technical data is not organized through association activities, the economic information is well-coordinated through the Swedish and Norwegian Cellulose Associations. These two organizations work closely together and are also in close contact with the Finnish Cellulose Union. Through the Sulphite Pulp Suppliers (known as the S.P.S.) there is a constant exchange of statistical data between all European producers. In this work no attempt is made to control the price of pulp, nor is it desirable or practical to do so. It is my personal opinion that much good will be accomplished by the exchange of information and only harm would result from attempts to control the world pulp prices.

The Operational Approach

I would like to suggest to members of TAPPI that you have a real responsibility to the pulp and paper industry to assist in applying the scientific or technical method of approach to the economic problems confronting the world industry. There is nothing like a trip abroad to show one how interdependent we all are, and yet the economic forces and mechanisms of the world are being manipulated by men whose outlook is primarily "political". It will remain so until we apply the quantitative and qualitative methods of science to our industrial and economic life.

"Man the Unknown"

Alex Carrel of the Rockefeller Institute, who is the author of a most illuminating book, "Man the Unknown", recently stated, "An analysis of the present economic system shows that it is breaking down . . . apparently there is no way out . . . I don't know the answer but possibly I know where the answer can be obtained.

"All of us are aware of the power of science. Science has shown its ability to develop the material world; but it has not been applied very much to the world of man. There is no reason why it should not be so applied. No doubt a very great effort is necessary, because the world of man is incomparably more complex than the world of matter. We must remember, in spite of the difficulties, that the scientific search for truth has always been rewarded. If we look for the solution to our present social, economic and political difficulties in the realm of science, there is no reason why we should not be able to find that solution.

"Before we can find a *solution,* however, we must discover the *cause* of our social, economic and political failure. The cause, I believe, is to be found in the fact that man has attempted to live according to his dreams, in a world ruled by natural laws. Economic and social structures are crumbling because they have been erected without regard for these laws. Our society must be founded, not on doctrines, but on scientific concepts of man and of his relations to his environment . . .

"How can we construct concepts which are true? There is only one way. We have, first, to make a clear distinction between what is a scientific concept and what is a dream or theory. We have to dismiss the dreamers, the philosophers and the sociologists, because they represent only abstractions born in our minds. If we could rebuild the world on scientific foundations, we would have an order and system which would work, because a scientific concept is a basis which is completely safe.

"A scientific concept corresponds with what the old physicists used to call an 'operational concept,' a concept which is equivalent to a set of operations which have been necessary to arrive at it."

The Only Way We Can Help

It is my good fortune to be personally acquainted with Dr. Carrel and I feel confident that his "operational approach" is the only way we can help to bring order out of the present disordered state of world affairs. Only quantitative and qualitative and economic measurements that relate to specific industrial "operations" can be used in freeing us from the uncertainties that arouse needless fears for the future.

I believe that because pulp is the underlying raw material upon which the paper industry is built that we in our industry have a real obligation to evaluate the economic as well as the technical aspects of the industry for the benefit of producer and consumer alike. To make the picture complete we need the assistance of the consumer of pulp, as well as the producers of pulp, and I bespeak the interest of you technically trained executives in the problems that our Association is trying to solve. We can only solve them effectively with your help.

Review Of The Paper Industry Literature

Abstracts Compiled By the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson and Clarence J. West, Chairman of the Committee.

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C. for 10 cents each. Send currency, not stamps.

Raw Materials

Stem Analysis and Its Value in Wood Research. Holz Roh u. Werkstoff 1, no. 2/3:3-13 (Oct.-Nov., 1937); B. I. P. C. 8:223.—Stem-growth studies, also called stem analyses, are investigations on the progress and increment volume and form of forest trees. Using data from disks taken at regular intervals from the trunk of the felled tree, a longitudinal-section drawing is prepared which depicits increment by 5- or 10-year periods, regions of similar wood density, form, crown, and boundary between sapwood and heartwood. The variability of properties, such as density, strength, heartwood formation, and resin, inside the stem, is discussed. Differences in density can be traced to ring width and proportion of summerwood. Several pines examined decreased in density from the base to the top of the tree. Percentage of heartwood in a tree fluctuates considerably according to species, race, age, site, and climate. Several comparisons are made of density, volume, and increment in individual trees.—C.J.W.

Hardwood Cellulose for the Viscose Industry. George A. Richter. Rayon Textile Monthly 18, no. 12:83-834 (Dec., 1937); B.I.P.C. 8:174.—Two types of hardwood cellulose have been developed as base material in the xanthation industry, one a hardwood sulfite and the other a hardwood alpha fiber. Physically, the hardwood fibers are shorter than the softwood fibers; they respond readily to the usual conversion steps for preparing xanthate and viscose, and require much less power and time for grinding the press cake to crumbs and aging. The hardwood fiber may be processed by itself or may be used satisfactorily in combination with other pulps. Tables are included comparing the chemical and physical constants of hardwood and softwood pulps.—C.J.W.

"Inexhaustible Supply" a dangerous dream. Fibre Containers 22, no. 11: 10, 12, 14, 16, 20 (November, 1937); B.I.P.C. 8: 171. An attempt is made to evaluate critically the southern pine supply, the present growth and drain, the possible future, drain, present conservation and its adequacy or inadequacy. Comprehensive periodic data with regard to growth, increment, and utilization drain are not available. Whether there is an "inexhaustible supply" of pulpwood in the south will depend on a number of factors, foremost of which is the immediate adoption of intensive forest management and sustained yield programs.—C.J.W.

Quick Growing Poplar Hybrids. Helge Rost. Svensk Pappers-Tidn. 40, no. 21: 509-27 (Nov. 15, 1937); B.I.P.C. 8:167. The article gives a complete resumé of the work carried out in the United States on hybridization experiments with poplars. Reference is made to French poplar plantations, fiber length, pulp yield, suitability of pulp, and possibilities for Swedish applications.—C.J.W.

Realization of a National Paper Industry. Neri Farina Cini. Ind. carta 4, no. 11: 411-416 (Nov., 1937); B.I.P.C. 8: 207.—A review is presented of the advances made in the Italian paper industry for making the country independent from foreign imports of raw materials.—C.J.W.

Italian Cellulose: Researches and Initiative of the Cartiera Italiana. Ind. Carta 4, no. 11:431-432 (Nov., 1937); B.I.P.C. 8:217.—Reference is made to experiment with bagasse, Libian esparto and alfa grass, wheat straw, broom, reeds and ramie. —C.J.W.

Pulp from Rice Straw. Luigi Burgo. Ind. carta 4, no. 11:429-430 (Nov., 1937); B.I.P.C. 8:220.—Reference is made to successful experiments by the Italian concern Cartiere Burgo for developing a satisfactory process of cooking rice straw pulp. Further problems involve the economical harvesting and storage of the straw prior to use.—C.J.W.

Pulpwood Production Studies in Short Leaf-Loblolly Pine Stands. R. R. Reynolds. Fibre Containers 23, no. 1:14-16 (Jan., 1938); B.I.P.C. 8:200.—Thinning experiments in old field and natural second-growth pine stands on experimental plots south of Crossett, Ark., are described. The studies were undertaken with the object of determining the most profitable method of cutting pulpwood and timber which will give the greatest return per acre and at the same time provide for a sustained yield. In five different plots 200, 100, 70, and 40 of the best trees, respectively, and all promising straight trees under 6 inches d.b.h. were left per acre; in the last plot all trees up to 7.5 inches and one good seed tree every 50 feet were left; this last practice follows almost exactly the cutting rules of the American Pulpwood Association. Although it will be some time before definite results are available, present indications are that the type of cutting leaving between 100 and 200 trees per acre will prove most profitable. Further advantages of cutting for a sustained yield are outlined, with special emphasis on the possibilities of large returns from timber growing, provided that good management in harvesting timber crops is applied—C.J.W.

Report of a survey made in Different Sections of Sweden in connection with practical and scientific Investigations for Improving the Quality of growth in Forestry Practice. Svensk Pappers-Tidn. 40, no. 23:578, 589 (Dec. 15, 1937); B.I.P.C. 8:200. —The article discusses the growth factors of birch, aspen, oak, beech, with brief reference to ash, basswood, hornbeam, elm, and certain foreign conifers. —C.J.W.

..**Fast-Growing Poplar Hydrids.** Helge Rost. Tek. Tid. 67, Uppl. A-C. Kemi, 89-100 (1937); C. A. 32:769.—A detailed discussion of numerous hydrids with reference to the cellulose industry.—C.J.W.

The Forest Situation in the Lower South. I. F. Eldredge. Paper Trade J. 105, No. 18: 93-102 (Oct. 28, 1937—.A review of the survey recently made by the Southern Forest Experiment Station of the timber resources of the South for for timber, naval stores and pulpwood uses. The need for sound forest management policies is pointed out to indicate what needs to be done to perpetuate the forests and the industries that they serve.—A.P.-C.

Wood for Southern Pulp Mills. Karl A. Swenning. Paper Trade J. 105, No. 18: 122-124 (Oct. (Oct. 28, 1937)The viewpoint of the timber land manager manager is given regarding the necessity of providing an adequate and sustained timber production to meet the requirements of the pulp industry. Recent effects toward co-operative effort on the part of the pulpwood and other wood using industries are described.—A.P.-C.

Cost of Pulpwood at Southern Hills—Cost of Growing Pulpwood. William L. Hall, Paper Trade J. 105, No. 19: 130-133 (Oct. 28, 1937; Pulp Paper wereffkSRDHRDLURDLURDLLLYPP Mag. Can. 38:827-829—.Costs of rocessing and delivering pine pulpwood at southern U. S. mills during 1937, including stumpage, are giveu as accurately possible.

Pulp Woods and Rayon Pulp. XI. Chemical Composition and Fiber Length of European Spruce Planted in Hokkaido, Japan. M. Shikata and K. Ogafa. J. Cellulose Inst. Tokyo 13: 319-322 (193).7—Japanese and Manchurian spruces are not inferior to European spruce grown in Hokkaido.—A.P.-C.

Tropical Wood Pulp and Pulp Cooking. I. Cooking of Tropical Hard Wood. M. Shikata and K. Ogawa. J. Cellulose Inst. Tokyo 13: 319-322 (1937).—Japanese and Manchurian spruces are not inferior to European spruce grown in Hokkaido.—A.P.-C.

Wood Chemistry. IX. Chemical Composition of the New Pulp Wood "Sugi" (Cryptomeria Japonica.) Y. Uyeda. J. Cellulose Inst. Tokyo 13:357-358 (1937.)—The composition is similar to that of pulp woods already in use, and the analytical data given including the values: cellulose 46.97 percent lignin 3,14%. and loss on drying 8 to 9 per cent.

Cellulose From Cotton. Frank K. Cameron. Mfrs. Record 106, No. 7: 33, 64 (1937).—Promising results have been obtained in exploratory investigations of growing and use of the whole cotton plant. Whole cotton gives by extraction a higher yield than can be obtained by pressing an equivalent weight of seeds alone. The extracted residue is admirably suited for pulping. A 3-hr. cook of the pulverized and degreased whole cotton with 1% caustic soda with agitation followed by settling gives a black liquor containing the dispersed pulp in suspension and a sediment containing the major part of the silica. The washed pulp contains less than 1% silica. Bleaching with chlorine under slight pressure gives alpha-cellulose containing only 0.1% silica. Whole cotalso gives a satisfactory alpha-cellulose when pulped by the standard methods (sulphite, sulphate or soda digestion). Successive treatment of the extracted residue with 2% nitric acid for 1 hr. at 90°C. and 1% caustic soda containing sulphite, followed by bleaching, gives a higher yield of alphacellulose than the standard alkali method.—A.P.-C.

Relationship Between Pine for Saw Timber, Pulpwood and Naval Stores. A. E. Wackerman Paper Trade J. 105, No. 18: 103-106 (Oct. 28, 197).—A review of the supplemental relationship in forest utilization between the requirements of southern pine for naval stores, saw timber and wood pulp production and the need for good management in the woods.—A.P.-C.

Lalang Grass (Imperata Arundinacea) as a Paper Making Material. Anon. Bull. Imp. Inst. 35: 311-316 (1937).—A sample of dried grass from Ceylon had the following composition: moisture 8.8%, ash 6.1%, cellulose 42.1% (equivalent to 46.2% (equivalent to 46.2% on the dry basis.) The fiber fimensions were: length 0.2 to 3.0 mm. (average 0.9, mostly 0.5 to 1.5), breadth 0.0047 to 0.0155 mm. (average 0.0047, mostly 0.006 to 0.009), ratio of average length to average breadth 122:1. Boiling 4 hrs. at 140° C. with 16 parts of caustic soda (as a 3% solution) per 100 parts of grass gave a 39.8% yield of dry pulp (equivalent to 43.6% calculated on the dry basis), that was well cooked and furnished an opaque, well-closed sheet, of greyish-cream color and possessing satisfactory strength. The pulp bleached very easily (yield 32.9%, or 36.1% calculated on the dry basis) to a good white color and furnished paper similar in other respects to the unbleached paper. Reducing the time of cooking to 3 hrs. proved just sufficient to produce a well cooked pulp with an increase of about 2% in yield of unbleached pulp, which bleached readily and gave bleached and unbleached papers similar in character to those obtained from the 4-hr. cook. On the whole, the ultimate fibers are somewhat similar to esparto fibers, but the paper produced from the pulp was harder and less bulky than esparto paper. The bleached pulp, either alone or in admixture with other materials, would be suitable for the manufacture of writing, book and printing papers.—A.P.-C

X-Ray Studies of Wood, Lignin and Wood-Cellulose. P. Nilakantan. Proc. Indian Acad. Sci. 5A:166-174 (1937).—X-ray examination of the heartwood of teak shows almost perfect micellar orientation with respect to the fiber axis in the brown compact layer, with a relatively large error of orientation in the less compact layers. Extraction of wood with various solvents affects the disposition of the micelles relatively to the fiber-axis. When wood swells in water there is no change of crystal lattice; the phenomenon is intermicellar. The crystalline element in wood is cellulose, and lignin as it is present in wood is amorphous.—A.P.-C.

Growth and Structure of Cotton Fibers. Donald B. Anderson and Thomas Kerr. Ind. Eng. Chem. 30: 48-54 (Jan., 1938).—From observations carried out on the Mexican Big Boll variety of American upland cotton *(Gossypium hirsutum)*, it is concluded that a number of the observations made upon cotton fiber walls cannot be accounted for by the ellipsoidal particle hypothesis, while the miscellar hypothesis appears to satisfy all of these observations.

Cellulose and Lignin

Solubility and Swelling of Cellulose and Its

Derivatives. E. Guth and Z. A. Rogovin. Colloid J. (U.S.S.R.) 3:327-335 (1937); C. A. 32:765.—A discussion of some data in the literature. Differences in solubility are due to changes in molecular volume, to mutual dipole interaction and to steric effects.—C.J.W.

Solubility of Cellulose and Its Esters. S. Papkov, Z. Rogovin and V. Kargin. J. Phys. Chem. (U.S.S.R.) 16:156-157 (1937); C. A. 32:765.—The temperature dependence of the solubilities of cellulose and its esters in organic liquids obey the laws applying to two mutually soluble liquids. Solvents and non-solvents for acetylcellulose show upper and lower critical temperatures.—C.J.W.

Carbohydrates. X. Viscosity Investigations of Cellulose Solutions. Ann. 532, no. 2: 94-103 (Oct. 21, 1937); B. I. P. C. 8:182.—Data are given for the viscosity of cellulose and Bemberg silk in cuprammonium hydroxide, tetraethylammonium hydroxide and sodium hydroxide, trimethyltolylammonium hydroxide and sodium hydroxide tetraethylphosphonium hydroxide and sodium hydroxide, tetraethylammonium hydroxide and 4 and 8 per cent solutions of copper ethylenediamine. The significance of the results is discussed. Cellulose with copper hydroxide in tetraethylammonium hydroxide gives a copper complex with approximately 50 per cent copper.—C.J.W.

Highly Polymerized Compounds. 181. Cellulose Solutions. Hermann Staudinger and Guenther Daumiller. Ber. 70B, no. 12: 2508-2513 (Dec. 1, 1937); B. I. P. C. 8:182.—Viscosity determinations of celluloses of various origins in different solvents such as Schweizer's reagent, copper ethylenediamine solution, *N* tetraethylammonium hydroxide solution, and 82 per cent phosphoric acid are carried out. It is found that solutions of cellulose of the same concentration have different specific viscosities in different solvents. The celluloses are dissolved in all these various solvents in the same way.—C.J.W.

Highly Polymerized Compounds. 180. The Degree of Polymerization of Cellulose in Various Species of Wood. Hermann Staudinger, Emil Dreher and Ingo Jurisch. Ber. 70B, no. 12: 2502-2507 (Dec. 1, 1937); B. I. P. C. 8:134.—Cellopolyoses, that is, cellulose and polysaccharides with thread-like molecules similar to cellulose, are extracted from woods such as poplar, pine, fir, spruce, and beech by means of Schweizer's reagent under special conditions. The cellopolyoses are precipitated by means of Ceignette salt and their degree of polymerization is determined by measurements of their viscosities. The results show that these cellopolyoses have a degree of polymerization of 900 to 1250, which is somewhat lower than those of sulfite and soda pulps. Cellopolyoses extracted from woods after pretreatment with chlorine dioxide have a degree of polymerization of 1000-1400, which is similar to those of fiber celluloses.—C.J.W.

Highly Polymerized Compounds. 182. Notes Concerning the Micellar Theory of Cellulose by Th. Lieser. Hermann Staudinger. Ber. 70B: no. 12: 2514-2517 (Dec. 1, 1937); B. I. P. C. 8:134.—In a polemic against Th. Lieser's micellar theory of cellulose, the author claims that the term "micell" should be used for cellulose in its solid state only. The colloid particles in dilute solutions of celluose and its derivatives are macromolecules. The crystalline parts of the solid cellulose are crystallites which have a macromolecular lattice. Such a crystallite may be termed "micell" according to Nägeli.—C.J.W.

Bonding Force of Cellulosic Materials for Water From Specific Volume and Thermal Data. Alfred J. Stamm and L. A. Hansen. J. Phys. Chem. 41: 1007-1016 (1937).—Measurements of the density of wood substance, cellulose and lignin, were made in helium, water and benzene. The helium valves, which appear to represent the true densities, when combined with previously determined values for the densities of the materials containing varying amounts of adsorbed water, determined in benzene, make it possible to calculate the compression occurring in the adsorbed water and, consequently, the internal or intrinsic pressure change. To meet the objection of those who believe that helium does not completely penetrate the voids of wood and cellulose and thus does not give true density values, the problem has also been approached from a thermal standpoint. A simple proportionality was found to hold between the heat of solution and the internal pressure change for exothermic aqueous solution systems in which the true densities can be definitely determined. When the proportionality constant is applied to the wood-water and cellulose-water systems, internal pressure changes of the adsorbed water in good agreement with the values calculated from the densities are obtained. The calculations indicate that initially adsorbed water is held by the wood, cotton and sulphite pulp with a force of about 26 kilobars or about twice the force with which water holds water. The surface-bound water (3 to 6 per cent) is held with an average force of about 22.5 kilobars. The average forces with which all of the water below the fiber-saturation point is held by wood, pulp and cotton are about 15.5, 14.7 and 13.5 kilobars, respectively, or 24, 17 and 8 per cent greater than the force with which water holds water.—A.P.-C.

Measurement of Molecular Areas of Cellulose From Different Sources By Surface Tension Method. II. J. K. Chowdhury and T. P. Bardham. J. Indian Chem. Soc. 13: 294-300 (1936).—Surface tension measurements of viscose solutions were used in calculating the molecular areas of cotton, jute and bamboo celluloses, with Gibbs' equation, resulting in value of 571, 263.1 and 129.5 sq. A., respectively.—A.P.-C.

X-Ray Diffraction Study of the Action of Liquid Ammonia on Cellulose and Its Derivatives. G. L. Clark and E. A. Parker. J. Phys. Chem. 41: 777-780 (1937).—An x-ray pattern of cellulose swollen with liquid ammonia indicates that the increase in size of the 101 interplaner distance is much greater than reported by previous workers, namely, 10.3 Angstrom units as compared with 8.86. This value decreased as the ammonia evaporated. Swollen ammonium native cellulose can be completely reverted to native cellulose by treatment with concentrated aqueous ammonia. The swollen mercerized cellulose is only 70 per cent reverted. Slow evaporation of ammonia from the swollen cellulose gives a new modification, cellulose III. The action of heat, dilute and concentrated ammonia, acetic acid and boiling water on cellulose III proved that the material derived from native cellulose was easier to revert to the parent substance. Sodium hydroxide of mercerizing strength converted cellulose III from both sources to mercerized cellulose. The acetylation of cellulose III was studied in comparison with the action on the other polymorphic variations of commercial cellulose acetate and saponified by liquid ammonia.—A.P.-C.

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports, of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING APRIL 23, 1938

SUMMARY

Cigarette paper	106 cs.
Wall paper	6 cs.
Newsprint	151 lbs., 4,273 cs.
Printing paper	54 cs.
Wrapping paper	65 cs.
Filter paper	46 pkgs., 19 cs.
Surface coated paper	6 cs.
Surface baryta coated paper	98 crates
Metal paper	2 cs.
Basic paper	6 cs.
Photo paper	10 cs.
Coated paper	1 cs.
Decalcomania paper	44 cs.
Decalcomanias	39 cs.
Tissue paper	38 bbls., 48 cs.
Blotting paper	3 cs.
Cardboard sheets	27 cs.
Paper tubes	128 cs.
Miscellaneous paper	36 cs.

CIGARETTE PAPER

American Tobacco Co., *Schodack,* Havre, 105 cs.
P. J. Schweitzer, *Exeter,* Marseilles, 1 cs.

WALL PAPER

——, *Bremen,* Bremen, 6 cs.

NEWSPRINT

N. Y. Evening Journal, *Markland,* Liverpool, N.S., 255 rolls.
N. Y. Tribune, *Markland,* Liverpool, N.S., 1,512 rolls.
World Telegram, *Markland,* Liverpool, N.S., 599 rolls.
Brooklyn Daily Eagle, *Markland,* Liverpool, N.S., 544 rolls.
Herald Statesman, *Markland,* Liverpool, N. S., 40 rolls.
N. Y. Post, *Markland,* Liverpool, N.S., 752 rolls.
Jay Madden Corp., *Scanstates,* Kotka, 414 rolls, 151 bls.
Perkins Goodwin & Co., *Hamburg,* Hamburg, 157 rolls.

PRINTING PAPER

Japan Paper Co., *American Trader,* London, 1 cs.
R. Wilson Paper Corp., *Caledonia,* Glasgow, 28 cs.
Steiner Paper Corp., *Gerolstein,* Antwerp, 23 cs.
W. Bersch, *Gerolstein,* Antwerp, 2 cs.

WRAPPING PAPER

Keller Dorian Paper Co., *Exeter,* Marseilles, 28 cs.
——, *Hamburg,* Hamburg, 29 cs.
Steiner Paper Corp., *Hamburg,* Hamburg, 8 cs.

FILTER PAPER

H. Reeve Angel & Co. Inc., *American Trader,* London, 7 cs.
H. Reeve Angel & Co. Inc., *Aquitania,* Southampton, 46 pkgs.
C. Schleicher & Schull Co. Inc., *Hamburg,* Hamburg, 12 cs.

SURFACE COATED PAPER

Moller Kokeritz & Co., *Bremen,* Bremen, 6 cs.

SURFACE BARYTA COATED PAPER

Globe Shipping Co., *Hamburg,* Hamburg, 98 crates.

METAL PAPER

K. Pauli Co., *Hamburg,* Hamburg, 2 cs.

BASIC PAPER

Globe Shipping Co., *Hamburg,* Hamburg, 6 cs.

PHOTO PAPER

W. Bersch, *Hamburg,* Hamburg, 10 cs.

COATED PAPER

W. J. Byrnes, *Aquitania,* Southampton, 1 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Samaria,* Liverpool, 44 cs. (duplex).

DECALCOMANIAS

Sellers Transportation Co., *Bremen,* Bremen, 39 cs.

TISSUE PAPER

F. C. Strype, *Samaria,* Liverpool, 4 cs.
Remington Rand, Inc., *Tokai Maru,* Kobe, 20 cs.
Jay Madden Corp., *Scanstates,* Helsingfors, 38 bbls.
Atlantic F'd'g Co., *Hamburg,* Hamburg, 24 cs.

BLOTTING PAPER

J. & H. Berge, *Samraia,* Liverpool, 3 cs.

CARDBOARD SHEETS

——, *Hamburg,* Hamburg, 27 cs.

PAPER TUBES

——, *Hamburg,* Hamburg, 128 cs.

MISCELLANEOUS PAPER

Columbia Ribbon & Carbon Manfg. Co., *Birmania,* Genoa, 11 cs.
Japan Paper Co., *Niel Maersk,* Kobe, 20 cs.
Japan Paper Co., *American Trader,* London, 5 cs.

RAGS, BAGGING, ETC.

Bank of N. Y. Trust Co., *Birmania,* Trieste, 350 bls. rags.
R. Blank, *Schodack,* Havre, 39 bls. rags.
Keene, Inc., *Schodack,* Havre, 49 bls. rags.
Keene, Inc., *Schodack,* Bordeaux, 142 bls. rags.
R. Blank, *Schodack,* Bordeaux, 40 bls. rags.
Chase National Bank, *Schodack,* St. Nazaire, 15 bls. new cuttings.
Chase National Bank, *Schodack,* Bordeaux, 28 bls. rags.
Chase National Bank, *Scanstates,* Copenhagen, 189 bls. bagging.
——, *Sarcoxie,* Havre, 60 bls. cotton waste.
Manufacturers Trust Co., *Sarcoxie,* Dunkirk, 6 bls. rags.
Chase National Bank, *Delphoi,* Odessa, 180 bls. flax waste.
Chase National Bonk, *Delphoi,* Odessa, 841 bls. old linen rags.
Chase National Bank, *Delphoi,* Odessa, 1,917 bls. old linen rags & waste.
Banco Coml Italiane Trust Co., *Delphoi,* Odessa, 604 bls. rags.
Burka Bagging Co., *Fort Amherst,* Halifax, 108 bls. bagging.
Bank of N. Y. Trust Co., *Ida,* Trieste, 145 bls. rags.
Castle & Overton, Inc., *Segundo,* Buenos Aires, 29 bls. rags.
E. J. Keller Co. Inc., *American Merchant,* ——, 48 bls. paper stock.
E. J. Keller Co. Inc., *Fernmore,* ——, 152 bls. paper stock.

GLUE STOCK

Darmstadt Scott & Courtney, *Ida,* Trieste, 140 bags.

OLD ROPE

F. Stern, *Black Eagle,* Rotterdam, 70 coils.
Banco Coml Italiane Trust Co., *Black Eagle,* Rotterdam, 43 coils.
W. Steck & Co., *Black Eagle,* Rotterdam, 12 coils.
W. Steck & Co., *Spaarndam,* Rotterdam, 46 coils.
Banco Coml Italiane Trust Co., *Caledonia,* Glasgow, 70 coils.

CHINA CLAY

Concentrate Manfg. Corp., *Samaria,* Liverpool, 16 bags.

WOOD PULP

Bankers Trust Co., *Birmania,* Trieste, 750 bls. sulphite.
Bankers Trust Co., *Deutschland,* Hamburg, 750 bls. sulphite, 152 tons.

Pulp Sales Corp., *Scanstates,* Kotka, 6,604 bls. sulphate, 1,320 tons.
———, *Ida,* Trieste, 750 bls. wood pulp.
Castle, & Overton, Inc., *Hamburg,* Hamburg, 125 bls. wood pulp, 25 tons.

BOSTON IMPORTS

WEEK ENDING APRIL 23, 1938

Stone & Downer Co., *Black Hawk,* Antwerp, 127 rolls wrapping paper.
D. C. Andrews & Co., *Black Hawk,* Antwerp, 21 bls. cotton waste.
International Purchasing Co., *Black Hawk,* Antwerp, 63 bls. old rope.
Spaulding & Tewksbury, *Black Hawk,* Rotterdam, 42 bls. wood pulp boards.
Royal Manfg Co., *Sarcoxie,* Havre, 20 bls. cotton waste.
———, *Sarcoxie,* Dunkirk, 12 bls. rags.
T. M. Dix, *Spaarndam,* Rotterdam, 223 bdls. wood pulp boards.

PHILADELPHIA IMPORTS

WEEK ENDING APRIL 23, 1938

E. J. Keller Co. Inc., *Schodack,* ———, 80 bls. rags.
Chase National Bank, *Schodack,* St. Nazaire, 46 bls. new cuttings.
Max Joseph, *Spaarndam,* Rotterdam, 50 bls. filter compound.
E. Mayer Co. Inc., *Astri,* Buenos Aires, 85 bls. old cotton bags.

NORFOLK IMPORTS

WEEK ENDING APRIL 23, 1938

Irving Trust Co., *Black Eagle,* Antwerp, 90 bls. bagging.
National City Bank, *Niel Maersk,* Kobe, 600 bls. bagging.
Darmstadt Scott & Courtney, *Niel Maersk,* Kobe, 260 bls. bagging.
Gottesman & Co. Inc., *Trolleholm,* Sweden, 1,800 bls. prime bleachable pulp.
Gottesman & Co. Inc., *Trolleholm,* Sweden, 2,750 bls. prime easy bleaching pulp.

Italy to Build Big Chemical Pulp Mill

The Soc. An. Cartiere Burgo, Turin, which is one of the leading paper mills in Italy, has recently signed an agreement with the Italian Institute for Industrial Reconstruction for the creation of a new company having a capital of fifty million lire, half of which is subscribed by I.R.I. and half by Burgo, according to a report from the office of the American Commercial Attache, Rome. The object of this newly formed company is a large scale production of chemical pulp to be made from domestic raw materials.

In an address by the head of the Burgo paper mill, regarding self-sufficiency in the chemical pulp industry, he pointed out the increasing demand for raw materials and the necessity for substituting chemical pulp for rags in the manufacture of paper, adding that Italy's requirements for the production of rayon, explosives, imitation leather, etc., amounts to about 300,000 metric tons per year.

Electric City Paper Mills Burned

The plant of the Electric City Paper Mills, Inc., was recently badly damaged by fire. It is believed that no insurance was carried on the mill.

Joseph Amdur, president of the mill stated that considerable new machinery had recently been installed. Ignition of molten asphalt by a spark from an acetylene torch was said by firemen to have caused the damage.

A New B&W Coal Pulverizer

A new coal pulverizer characterized by low power consumption, high capacity for a given grinding-ring diameter, low maintenance, and quiet operation has been developed by The Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y. It is known as the B&W Type E Pulverizer. It utilizes the well-known ball-bearing principle of pulverizing common to all B&W Type B Pulverizers and supplants the latter in a certain range of sizes.

High capacity for a given size and power consumption as low as 9 kw.-hr. per ton of Pittsburgh seam coal pulverized to pass 65 per cent through 200 mesh result from outward radial flow of coal and improved classification of fines. Maintenance costs are low because of the use of improved ball material and increased capacity. Smooth, quiet operation result from isolation of the grinding elements from the housing, short main shaft and heavy construction, and its moderate speed.

The coal is pulverized by a single row of large-size balls between a stationary top ring and a rotating bottom ring driven from the base of the mill. Raw coal is fed to the inside of the upper grinding ring and, aided by centrifugal force, passes outward between the grinding balls. Preheated air passing upward between the grinding elements and the housing picks up the ground coal-particles, drying them as it carries them to a rotating classifier in the top of the pulverizer whence oversize particles are returned to the grinding zone for further reduction. Fineness of the coal delivered is regulated by the air flow through the mill.

Capacities of the sizes now designed are from 2.0 to 13 tons per hour.

Simplified Practice for Boxes

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 22, 1938—A proposed simplified practice recommendation, covering sizes and caliper thicknesses of stock folding boxes for garments, has been mailed to the producers of stock folding boxes, the manufacturers of garments, the garment stores, dry cleaning establishments, and others interested, by the Division of Simplified Practice of the National Bureau of Standards for consideration and approval.

This recommendation for stock folding boxes for garments was developed by the Folding Paper Box Association of America, based on the results of a variety survey of types and sizes of boxes available for the purpose indicated.

The adoption of this recommendation by the stock box manufacturers, the garment industry, the dry cleaners, and others interested should result in advantages to all concerned.

Arthur W. Coll Get Tribute

KALAMAZOO, Mich., April 22, 1938—A tribute was paid to Arthur W. Cole, general superintendent of the Rex Paper Company, on ending twenty consecutive years of service at the mill. An informal program was held and he was presented with a bouquet of flowers. There are nine other employees who have been with the company for a similar period.

New York Market Review

Office of the PAPER TRADE JOURNAL
Wednesday, April 27, 1938.

Demand for many grades of paper in the wholesale market is reported improved for the current week. Although opinions on the state of business differ to a considerable extent, more optimism is expressed and the prevailing opinion seems to be that a gradual improvement in sales volume may be expected in the future.

While the general rate of business activity is at a low level when compared with the corresponding period in April of last year, the paper industry is doing better than other industries. While no reliable figures on the distribution of paper are available, the production ratio of mills, other than newsprint, is now only about 25 per cent under April of last year, when theh production ratio was 93.3 per cent. With paper production now at a comparatively high level, considering the business recession, the sales volume of paper is currently much better than many admit and greater than in most other lines of consumer goods.

The contract demand for newsprint is quite active and shipments are moving in normal volume.

The demand for sulphite bond papers is reported improved for the week. Business in April was better than in the preceding month. Other grades of paper such as tissues, are little changed for the week. Some price cutting is reported in various lines but the market prices of most grades of paper are unchanged this week.

The demand for box board is reported as slightly less for the week and no increase in sales volume is expected in the trade in the near future. No change in prices are reported.

Chemical Pulp

The demand for chemical pulp continues very light. Prices are unchanged for the week. We are informed by the Pulp Sales Corporation, the leading importer of Finnish pulp, that the comment of the preceding week that, "For the current week lower prices are quoted on Finnish pulp", is incorrect. No reductions have been made in the prices of Finnish pulp.

Mechanical Pulp

Demand for mechanical pulp is reported as light. No change in prices are reported for the current week.

Old Rope and Bagging

The old rope market is very quiet and prices continue practically nominal. The demand for old bagging is very light and prices are unchanged.

Rags

Demand for all grades of new and old domestic rags is very light and quotations are practically nominal. The foreign rag market continues inactive, at nominal prices.

Waste Paper

The waste paper market is very quiet for all grades. Quotations are unchanged and are practically nominal, with the lower grades at record low prices.

Twine

The twine market is quiet. No change in demand or prices are expected by the trade in the near future.

Denmark Shifts Board to Free List

The Danish Ministry of Commerce, by a decree effective from March 2, transferred the preponderant share of all products listed under commodity number 19 (paper and products thereof) of the foreign exchange control law, from its bound to its free list. The products released had an import value of about 18,000,000 Crowns in 1936. The individual items transferred to the free list are as follows: raw cardboard for the manufacture of roofing materials, white cardboard weighing 900 grams per square meter; other cardboard; cellulose crepe; other cardboard, carton and paper in rolls, sheets, etc., which belong under commodity group 19, not specifically mentioned.

To Manufacture Pliofilm Ribbons

Freydberg Bros., Inc., of Stamford, Conn., announce that they have been appointed converters of Pliofilm for the making of ribbons, cords, tapes and bindings.

Pliofilm is a transparent film manufactured by the Goodyear Tire and Rubber Company. It has great tensile strength and is extremely soft and flexible. The film itself is completely waterproof and readily lends itself to stitching.

Ribbons and cords made of Pliofilm will be exceedingly strong, will tie easily, and have many other important decorative qualities never before achieved in any transparent material.

Dillard Made Brown Distributor

The Dillard Paper Company of Greenville, S. C., has been made a distributor in that city and vicinity for L. L. Brown's Linen Ledger, the 100 per cent new white rag permanent record paper made by the L. L. Brown Paper Company, Adams, Mass. The Dillard Paper Company already has the agency for this grade, as well as Greylock Linen Ledger, in Greensboro and Charlotte, N. C.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, April 27, 1938.

BLANC FIXE—The demand for blanc fixe is about an the level of the preceding week. Prices are unchanged and conform to prevailing quotations. The pulp is quoted at from $42.50 to $45 per ton, in bulk; the powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—The price of bleaching powder is unchanged for the week. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The demand for casein is reported as good for the week. Domestic standard ground casein is quoted at 7 cents per pound; domestic finely ground at 8 cents per pound. All prices in bags, car lot quantities.

CAUSTIC SODA—Prices of caustic soda are unchanged at prevailing prices. Solid caustic soda is quoted at from $2.10 to $2.30 per 100 pounds; flake and ground at from $2.50 to $2.70 per 100 pounds; in drums at works.

CHINA CLAY—The china clay market reports prices as unchanged at prevailing quotations. Imported clay is quoted at from $14.50 to $25 per ton, ship side. Domestic filler clay is quoted at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton, at mines.

CHLORINE—The price of chlorine is unchanged at prevailing prices. Chlorine is quoted at $2.15 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The demand for rosin is reported improved for the week. "G" gum rosin is quoted at $4.60; "FF" wood rosin at $4.75 per 280 pounds, gross weight, in barrels at Savannah. Seventy per cent rosin size is offered at $2.63 per 100 pounds, f.o.b., shipping point.

SALT CAKE—Prices of salt cake conform to prevailing quotations. Prices range at from $12 to $13.50 per ton; chrome salt cake at from $11 to $12 per ton, f.o.b., shipping point. Imported salt cake is offered at from $14.50 to $15 per ton, Gulf or Atlantic Seaboard, on dock.

SODA ASH—The prices of soda ash conform to quotations of the preceding week. Prices of soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05; and in barrels, $1.35.

STARCH—The prices of corn starch are unchanged for this week. Globe pearl is quoted at $2.60 per 100 pounds, in bags, and at $2.85 in barrels. Special paper starch is offered at $2.70 per 100 pounds, in bags, and at $2.95 in barrels. All prices in car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Prices of sulphate of alumina are unchanged for the week. The commercial grades are quoted at from $1.25 to $1.60 per 100 pounds; iron free at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The sulphur market reports prices as unchanged for the week. Annual contracts are quoted at $18 per long ton, f.o.b., cars at mines. Sport and nearby car lots are quoted at $21 per ton.

TALC—The prices of talc conform to prevailing quotations. Domestic talc is quoted at from $15 to $18 per ton, Eastern mines. Imported talc is quoted at from $25 to $40 per ton, on dock.

American Paper Goods Profits Up

American Paper Goods Company and subsidiaries reports for 1937 a net income of $110,514, equal, after preferred dividends, to $3.42 each on 30,000 common shares, compared with $89,918, or $2.72 a common share, in 1936.

Market Quotations

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	@	—
Kraft—per cwt.—Delivered Zone A			
No. 1 Northern	$5.12½	@	$5.37½
Superstandard	5.00	@	—
Northern Standard Wrapping	4.50	@	—
Standard Wrapping	4.00	@	—
Tissues—Per Ream—Carlots			
White No. 1	.92½	@	—
White No. 1 M. G.	.90	@	—
White No. 1½	.67½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.75	@	—
Colored	.87½	@	—
Kraft	.75	@	—
Manila	.60	@	—
Unbl. Toilet, 1 M.	3.20	@	—
Bleached Toilet	5.26	@	—
Paper Towels—			
Unbleached	1.80	@	—
Bleached	2.10	@	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	$8.25	@	$10.25
No. 2 Jute	7.50	@	9.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Boards, per ton—			
News	$30.00	@	—
Chip	30.00	@	—
Sgl. Mla. Ll. Chip.	45.00	@	—
Jute Lined Chip	45.00	@	—
White Pat. Coated.	57.50	@	—
Kraft Liners	55.00	@	—
Binders Boards	75.00	@	80.00

The following are representative of distributors' resale prices:—

Rag Content Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1.	$41.40@$48.50	$42.55@$50.00
100% Rag	32.80@ 38.50	33.95@ 39.75
85% Rag	.....	32.20@ 37.75
75% Rag	24.75@ 29.00	25.90@ 30.50
65% Rag	21.65@ 26.25	22.80@ 27.75
50% Rag	18.70@ 22.75	19.90@ 24.25
25% Rag	15.80@ 19.25	16.95@ 20.75

Regular Colors @ $1.50 cwt. extra.
Heavy Colors @ $3.00 cwt. extra

Sulphite Bonds and Ledgers—
White, Assorted Items,
Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$8.80@$10.75	$9.95@$12.00
No. 2	7.90@ 9.50	9.05@ 11.00
No. 4	7.00@ 8.50	8.20@ 10.00

Colors .75 cwt. extra.

Free Sheet Book Papers—
White, Cased Paper,
Delivered in Zone 1:

No. 1 Glossy Coated	$12.15@$14.25
No. 2 Glossy Coated	10.55@ 12.25
No. 3 Glossy Coated	9.35@ 11.00
No. 4 Glossy Coated	8.80@ 10.50
No. 1 Antique (watermarked)	8.80@ 10.50
No. 2 Offset	8.05@ 9.50
A Grade E. F.	7.90@ 9.50
A Grade S. & S. C.	8.15@ 9.75
B Grade E. F.	7.30@ 8.75
B Grade S. & S. C.	7.55@ 9.00
C Grade E. F.	7.00@ 8.50
C Grade S. & S. C.	7.25@ 8.75
D Grade E. F.	6.75@ 8.25
D Grade S. & S. C.	7.00@ 8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	27.00	@	30.00
Dry	27.00	@	30.00

(Delivered)

No. 1 Domestic and Canadian	29.00	@	33.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.00	@	3.50
Prime Qualities— Easy-Bleaching Sulphite	2.50	@	2.75
Strong Unbleached Sulphite	2.25	@	2.50

(On Dock, Atlantic Ports)

Kraft Bleached	3.00	@	3.25
Kraft Light & Strong	2.50	@	2.75
Kraft No. 1	2.25	@	2.50
Kraft No. 2	1.90	@	2.00

(F.o.b. Pulp Mill)

Kraft Domestic	2.00	@	2.50

(Delivered)

Soda Bleached	2.90	@	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.50	@	6.75
Silesias No. 1	5.00	@	5.25
New Unbleached	7.00	@	7.25
Blue Overall	5.50	@	6.00
Fancy	3.00	@	3.10
Washables	2.10	@	2.25
Mixed Khaki Cuttings	3.60	@	3.75
O. D. Khaki Cuttings	4.35	@	4.50

Old Rags

White, No. 1—			
Repacked	3.40	@	3.50
Miscellaneous	2.75	@	3.00
White, No. 2—			
Repacked	2.10	@	2.25
Miscellaneous	1.70	@	1.80
Thirds and Blues—			
Repacked	1.40	@	1.50
Miscellaneous	1.25	@	1.30
Roofing Rags—			
No. 1	.90	@	.95
No. 2	.70	@	.75
No. 3 (bagging)	.65	@	.70
No. 4	.65	@	.70
No. 5A	.65	@	.70

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	@	2.10
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxford	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.00
No. 2 White Linens	6.50	@	7.00
No. 3 White Linens	4.50	@	4.80

Mundt

Perforated Screens
For Pulp and Paper Mills

Steel, Copper, Brass
Bronze, Monel Metal
and Other Alloys
Punched for Centrifugal
and Rotary Screens,
Pulp Washers, Drainer
Bottoms, Filter Plates, etc.

Charles Mundt & Sons
67 Fairmount Ave. Jersey City, N. J.

WOOD PULP
AGENTS

PRICE & PIERCE, Ltd.,

60 EAST 42nd ST.
NEW YORK

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Tell us your needs and we'll send complete information and blue prints of Kalamazoo Vitrified Glazed Tile for Jordan Chests, beater storage chests, beater dump chests, Fletcher-Bleachers, and stock chests. Also Wood Tanks, Acid Tanks, and Blow Pits.

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TANK & SILO COMPANY
KALAMAZOO, MICHIGAN

WATERBURY FELTS

Are Made By

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ORISKANY, NEW YORK

TRIMBEY MACHINE WORKS
GLENS FALLS, N. Y.
Manufacturers of
WEIGHT REGULATORS
CONSISTENCY REGULATORS
PROPORTIONING AND METERING SYSTEMS
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CHEMICAL PULP MILL ENGINEERS
Chemical Pulping Processes ☆ Operating Surveys
Appraisals ☆ Estimates
500 WOOLWORTH BUILDING, WATERTOWN, N. Y.
3311 FIRST AVENUE SOUTH, SEATTLE, WASH.
- Associated with -
CHEMIPULP PROCESS LIMITED
403 Crescent Building, Montreal, Quebec

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	@	4.75
No. 2 White Cotton.	3.25	@	3.75
No. 3 White Cotton.	2.50	@	3.00
No. 4 White Cotton.	1.90	@	2.20
Extra Light Prints..	2.00	@	2.40
Ord. Light Prints...	1.75	@	2.15
Med. Light Prints...	1.55	@	1.95
Dutch Blue Cottons..	2.25	@	2.50
French Blue Linens..	3.00	@	—
Checks and Blues...	2.00	@	—
Linsey Garments....	1.90	@	2.00
Dark Cottons.....	1.50	@	1.60
Old Shopperies.....	1.30	@	1.45
New Shopperies.....	1.45	@	1.50
French Blues.....	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.20	@	2.25
Domestic	2.00	@	2.15
Wool Tares, light....	1.50	@	1.75
Wool Tares, heavy..	2.00	@	2.10
Bright Bagging.....	1.60	@	1.70
Manila Rope—			
Foreign	3.00	@	3.25
Domestic	2.75	@	3.00
Jute Threads.....	2.75	@	3.00
Sisal Strings.....	1.75	@	2.00
Mixed Strings.....	.60	@	.70

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.25	@	2.35
Ordinary Hard White No. 1....	1.90	@	2.00
Soft White No. 1..	1.80	@	2.20
Flat Stock—			
Stitchless	.70	@	.80
Overissue Mag.....	.60	@	.70
Solid Flat Book...	.55	@	.60
Crumbled No. 1....	.40	@	.45
Ledger Stock.....	.90	@	.95
New B. B. Chips....	.15	@	.20
Manila—			
New Env. Cut....	1.85	@	2.00
New Cuttings.....	1.50	@	1.60
Old Kraft Machine—			
Compressed bales..	.70	@	.80
News—			
No. 1 White News	1.25	@	1.30
Strictly Overissue.	.45	@	.50
Strictly Folded....	.20	@	.25
No. 1 Mixed Paper..	.05	@	.10

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.12½	@	.14
White Hemp.....	.13½	@	.15
Fine Polished—			
Fine India.....	.16	@	.18
Unpolished—			
Box	.09	@	—
Paper Makers.....	.08	@	.09½
Tube Rope.....	.10¾	@	.11½
Wall Paper.....	.10¾	@	.11½
Wrapping	.12	@	.14
Soft Fiber Rope...	.10¼	@	.11¼
Cotton	.16	@	.22

(Hard Fiber)

Medium Java.....	.09	@	.10
Mex. Sisal.....	.08½	@	.09½
Manila	.18	@	.25

Domestic	2.25	@	2.50
Sisal Rope.....	1.65	@	1.75
Mixed Rope.....	.50	@	.55
Transmission Rope...	1.25	@	1.50
Soft Jute Ropes....	1.90	@	2.00
Jute Carpet Threads.	1.00	@	1.50
Gunny Bagging—			
Foreign	2.20	@	2.25
Domestic	1.75	@	1.85
Bleachery Burlap....	3.25	@	3.75
Scrap Burlap—			
Foreign	1.65	@	1.80
Domestic	—	@	1.90
Scrap Sisal	1.25	@	1.50
Scrap Sisal for Shredding	1.75	@	1.90
Wool Tares, Heavy..	1.50	@	1.60
New Burlap Cuttings	1.85	@	2.00
Aust. Wool Pouches	3.00	@	—
Heavy baling bagging	2.00	@	—
Paper Mill Bagging.	1.50	@	1.60
No. 2 Bagging.....	.50	@	.60

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.03	@	.03¼
New White No.1..	.06¾	@	.07
New White No. 2.	.05	@	.05½
New Light Flannelettes	—	@	.05½
Silesias No. 1.....	.05¼	@	.05½
New Black Silesias..	.03¾	@	.04
Silesias No. 1			
Soft Unbleached.....	.06¾	@	.07
Blue Cheviots.....	.05	@	.05½
Fancy	.03	@	.03¼
Washable	.02¾	@	.03

Cottons—According to grades—			
Blue Overalls.....	.05	@	.05½
New Black, soft...	.03¾	@	.04
Khaki Cuttings....	.03¼	@	.03½
O. D. Khaki.....	.04	@	.04½
Corduroy	.02¾	@	.03
New Canvas.....	.07¼	@	.07½
B.V.D. Cuttings.....	—	@	.06½

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues.....	1.75	@	2.00
Third and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings.....	3.90	@	4.00
Roofing Stock—			
No. 1.....	1.00	@	1.10
No. 2.....	.75	@	.85
No. 3.....	.65	@	.70

Foreign Rags

(F. o. b. Boston)

Dark Cottons.....	1.00	@	1.10
Dutch Blues.....	2.75	@	2.90
New Checks and Blues	2.85	@	3.00
Old Fustians.....	2.50	@	2.60
Old Linsey garments.	1.75	@	1.90
New Silesias.....	6.00	@	6.50

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.05½	@	.06
New White, No. 2.	.03½	@	.04
Light Silesias.....	.04½	@	.05
Silesias, No. 1....	—	@	.04½
Black Silesias, soft.	.03	@	.03½
New Unbleached..	—	@	.06
Washable, No. 1..	.01¾	@	.01½
Blue Overall.....	.04	@	.04½
Cottons—According to grades—			
Washable No. 2...	.01	@	.01¾
New Blue.....	.01	@	.01¾
Fancy Percales....	—	@	.02½
New Black Soft...	.03	@	.03½
New Light Seconds	—	@	.04½
New Dark Seconds	.50	@	.75
Khaki Cuttings—			
No. 1 O. D.....	.03½	@	.04
No. 2 Mixed.....	.02	@	.02½
Corduroy	—	@	.02
New Canvas.....	.05	@	.05½
New Black Mixed.	.02½	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	2.50	@	3.00
Miscellaneous	2.25	@	2.50
Thirds and Blues—			
Miscellaneous	1.00	@	1.25
Repacked	1.00	@	1.25
Black Stockings (Export)	3.00	@	3.50
Roofing Stock—			
Foreign No. 1....	—	@	.75
Domestic No. 1...	—	@	.75
Domestic No. 2...	.50	@	.65
Roofing Bagging..	.80	@	.90

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	1.50	@	1.75
Domestic	1.50	@	1.75
Manila Rope.....	3.00	@	3.25
Sisal Rope.....	1.75	@	2.00
Mixed Rope.....	.75	@	1.00
Scrap—			
No. 1.....	—	@	1.25
No. 2.....	1.00	@	1.25
Wool Tares, heavy..	3.25	@	3.50
Mixed Strings.....	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	1.75	@	2.00

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	2.35	@	2.40
No. 2 Hard White.	2.00	@	2.10
No. 1 Soft White..	2.00	@	2.10
No. 2 Soft White..	1.40	@	1.50
No. 1 Mixed.....	.70	@	.75
Solid Ledger Stock..	1.50	@	1.60
Ledger Stock, white.	1.25	@	1.30
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy..	.85	@	.90
Manila Cuttings.....	1.50	@	1.75
Print Manila.....	.45	@	.50
Container Manila....	—	@	.40
Kraft Paper.....	.90	@	.95
No. 1 Mixed Paper..	.25	@	.30
Straw Board Chip...	.25	@	.30
Binders Board Chip.	.25	@	.30
Corrugated Board...	.50	@	.55
Overissue News.....	.55	@	.60
Old Newspapers	.30	@	.35

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.25	@	2.40
No. 1 Soft White..	1.85	@	2.15
No. 2 Mixed.....	.75	@	.80
Solid Ledger Books..	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers.....	.85	@	.90
No. 1 Books, heavy..	.65	@	.75
No. 1 Books, light...	.65	@	.75
Crumpled Stitchless Book Stock.....	.55	@	.65
Manila Env. Cuttings	1.60	@	1.70
Manila Envelope Cuttings, extra quality	2.00	@	2.10
No. 1 Old Manila....	.85	@	.95
White Blank News..	1.30	@	1.40
No. 1 Kraft.....	—	@	.80
Mixed Papers.....	—	@	.10
Print Manila.....	.45	@	.50
Container Manila...	.27½	@	—
Old Newspapers.....	.25	@	.32½
Paper Wool Strings..	—	@	.50
Overissue News.....	.45	@	.50
Box Board Chips....	.20	@	.25
Corrugated Boxes....	.25	@	.27½
Kraft corrugated boxes	.25	@	.30
Screenings wrappers.	.45	@	.50

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.50	@	2.75

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings....	1.80	@	1.90
No. 1 Hard White.	1.70	@	1.80
No. 1 Soft White..	1.50	@	—
Ledger & Writings..	.75	@	.80
Solid Books.....	.55	@	—
Blanks	.90	@	—
Krafts	.60	@	—
New Kraft Cuts.....	1.10	@	—
Manila Env. Cuts...	Nominal		
Ex. No. 1 Manila...	Nominal		
Print Manila.....	Nominal		
Overissue News.....	.35	@	—
Old Newspapers—			
No. 1 Folded News	.30	@	—
No. 1 Mixed Paper	.20	@	—
Roofing Stocks—			
No. 1.....	2.00	@	2.10
No. 2.....	1.85	@	2.00

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	.36½
No. 1 Tints	.36½	@	.37½
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	—	@	.1550
No. 4 Tints	.16	@	.1650
No. 5 Bond—White	.11.35	@	—
No. 5 Bond—Tints	.12.35	@	—
No. 5 Bond—Golden Rod	13.35	@	—
No. 5 Ledger—White	.1185	@	—
No. 5 Ledger—Tints.	.1285	@	—
No. 6 Bond—White	.10.75	@	—
No. 6 Bond—Tints	.11.25	@	—
No. 6 Bond—Golden Rod	12.75	@	—
No. 7 Bond—White .	9.10	@	—
No. 7 Bond—Tints .	9.60	@	—
No. 7 Bond—Golden Rod	11.10	@	—
Book—			
No. 1 M. F.	7.10	@	7.35
No. 2 M. F.	6.85	@	7.20
No. 3 M. F.	5.60	@	6.20
No. 1 S. C.	7.60	@	7.85
No. 2 S. C.	7.10	@	7.35
No. 3 S. C.	6.10	@	6.35
No. 1 Coated and Litho	12.50	@	—
No. 2 Coated and Litho	11.00	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted.....	13.50	@	—
Wrapping—delivered—			
Rag Brown.....	4.85	@	5.55
White Wrap.....	4.00	@	—
"B" Manila.....	4.90	@	6.25
No. 1 Manila.....	5.50	@	7.00
Fiber	5.50	@	—
Kraft, No. 2.....	5.50	@	—

(F. o. b. Cars, Toronto)

News, per ton—			
Rolls (contract)..$46.00		@	—
Sheets 54.00		@	—

Pulp

Ground wood.....29.50		@	—
Unbleached Sulphite.54.00		@	—
Book (Class 1).....64.00		@	—
Writing (Class 2)....62.00		@	—
Select (Class 3).....63.00		@	—
Kraft 50.00		@	—
Soda 56.00		@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut...	2.25	@	—
Soft White.....	2.15	@	—
White Blk. News..	1.25	@	—
Book and Ledger—			
Flat Magazine and Book Stock (old)	.80	@	—
Light and Crumpled Book Stock.	.75	@	—
Ledgers and Writings	1.10	@	—
Manilas—			
New Manila Cut...	1.35	@	—
Printed Manilas...	.55	@	—
Kraft	1.00	@	1.55
News and Scrap—			
Strictly Overissue.	.55	@	—
Strictly Folded....	.50	@	—
No. 1 Mixed Paper..	.40	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.06¾	@	.07
Fancy Shirt Cuttings	.02½	@	.03¼